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ABSTRACT

This document contains a career education resource guide for junior high school students which is designed to build career awareness by means of occupational narratives, evaluative questions, activities, and career games. The information is presented in the following fourteen occupational clusters: industrial production occupations; office occupations; service occupations; education occupations; sales occupations; construction occupations; transportation occupations; scientific and technical occupations; mechanics and repairers; health occupations; social scientists; social service occupations; performing arts, design, and communications occupations; and agriculture, forestry, and fishery occupations. Based on interviews with actual workers, the occupational narratives emphasize what people do on the job, how they feel about it, and the importance of knowing oneself when considering a career. This resource guide can be used in middle schools, junior high classrooms, career resource centers, or youth programs run by community, religious, and business organizations. (BM)

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Exploring Careers

U.S. Department of Labor
Ray Marshall, Secretary

Bureau of Labor Statistics
Janet L. Norwood, Commissioner
1979

Bulletin 2001

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U S DEPARTMENT OF HEALTH,
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Exploring Careers is available either as a single volume of 15 chapters or as separate chapters, as follows:

The World of Work and You
Industrial Production Occupations
Office Occupations
Service Occupations
Education Occupations
Sales Occupations
Construction Occupations
Transportation Occupations
Scientific and Technical Occupations
Mechanics and Repairers
Health Occupations
Social Scientists
Social Service Occupations
Performing Arts, Design, and Communications Occupations
Agriculture, Forestry, and Fishery Occupations

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SUMMARY. Essays, questionnaires, and games provide information which helps the reader assess his or her interests and talents in order to make career choices.
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Preface

Exploring Careers is a career education resource for youngsters of junior high school age. It provides the kind of information about the world of work that young people need to prepare for a well-informed career choice. At the same time, it offers readers a way of learning more about themselves. The publication aims to build career awareness by means of occupational narratives, evaluative questions, activities, and career games presented in 14 occupational clusters. *Exploring Careers* emphasizes what people do on the job and how they feel about it and stresses the importance of "knowing yourself" when considering a career. It is designed for use in middle school/junior high classrooms, career resource centers, and youth programs run by community, religious, and business organizations.

Exploring Careers was prepared in the Bureau's Division of Occupational Outlook under the supervision of Russell B. Flanders and Neal H. Rosenthal. Max L. Carey provided general direction. Anne Kahl supervised the planning and preparation of the publication. Members of the Division's staff who contributed sections were Lisa S. Dillich, David B. Herst, H. Philip Howard, Chester Curtis Levine, Thomas Nardone, Debra E. Rothstein, and Kathy Wilson. Gloria D. Blue, Brenda Marshall, and Beverly A. Williams assisted.

The Bureau gratefully acknowledges the cooperation of the workers who agreed to be interviewed and photographed, the teachers and students who field tested a sample chapter, and all who shared their ideas with BLS. Many people in the counseling community offered encouragement and support. Special thanks for her generous assistance go to Cathy Cockrill, Career Education Curriculum Specialist, Fairfax County Public Schools, Fairfax, Virginia.

Although they are based on interviews with actual workers, the occupational narratives are largely fictitious.

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The World of Work and You

The world of work may seem far away right now.

Exploring Careers

Have you ever dreamed of being an actor or actress? An airplane pilot? A deep-sea diver? Daydreaming about careers is fun, and most of us do it. But when it's time to choose a career, you need information. The more information you have to start out with, the better your decision will be. This book tells you some of the things you need to know about the world of work and suggests ways of learning more.

It's not time yet for you to choose a job. But it's not too early to start preparing for the decisions you'll be making a few years from now. How should you go about choosing the direction that is "right" for you? The key is *you*: Your interests, abilities, and goals. You're more likely to make a satisfying career decision if you can come up with a pretty good match between the things you are and want and like to do—and the things a job requires.

Exploring careers therefore means exploring yourself. It means looking inward, identifying your talents, taking stock of your strengths and weaknesses. It means asking questions: What am I really like? What am I good at? What do I want to do with my life? If this seems hard, remember that your family, friends, teachers, and counselors can help you learn more about yourself.

Exploring careers means finding out as much as you can about different types of work in order to see what suits you best. Try to find out which fields match your needs and abilities. Taking the time to explore the world of work doesn't guarantee a satisfying job, but it helps.

Exploring careers means exploring yourself.

Exploring careers also means examining lifestyles and values, for in a sense, your career is everything you do with your life. Career exploration means discovering all of the activities that are possible, meaningful, and satisfying for you.

Quite possibly you'll work for most of your adult life. But you'll spend time with family and friends, take courses from time to time, travel, putter around the house, and spend time on civic, religious, and community activities. Your life will be the sum total of all your interests and activities.

As you explore careers, try to discover how a particular job would fit the lifestyle you prefer. How much of your time, energy, and emotion would a particular job demand? How much do you want to save for yourself?

You'll find that this book is mostly about jobs. It tells what people do on the job, how they feel about their work, what sort of training they have had, what they plan for the future, and how their jobs affect their lives. Throughout the book, there are questions to answer and things to do that will bring you closer to the world of work. Our purpose is to help you identify the personal traits and aptitudes that different jobs require and to encourage you to match these with what you know about yourself. That's what career exploration is all about.

Why so much emphasis on jobs? Well, your job is likely to be one of the most important of your life's activities. Jobs of one kind or another, and the training you need to do them well, will probably take a lot of your time. So much time, in fact, that the rest of your life's routine may be organized around your job—much as your routine these days is organized around school.

The amount of time that you're likely to spend working is reason enough to give some careful thought to your career. A person who works full time for 35 years, averaging 40 hours a week for 50 weeks a year, will spend 70,000 hours of his or her life at work! Compare this with the approximately 17,000 hours you will have spent in school when you graduate from high school.

Why People Work

People work for all kinds of reasons. In the next few pages, we're going to take a look at some of them. We've included some activities to help you develop a feeling for your own reasons for working. That's something you'll need to be clear about when the time comes to choose a career.

Most people work, first and foremost, to make money. They work to be able to buy necessities like food, clothing, and a place to live. They work, too, for the money to buy leisure and convenience goods like cars, stereo equipment, movie tickets, and camping gear. The list of things we like to spend money on is very long indeed. People also work to save for major expenditures—education, travel, medical bills—and for the time when they will not be earning as much as they are now. Being able to pay for all your expenses yourself gives you economic security. You may already sense the kind of independence that having some money of your own can give you.

How important is it to you to make a lot of money? Are you willing to put in long hours at a job to do so? Or is it more important to you to have time for yourself, for family, for your favorite leisure activities? Think about these things. They will be important in determining the jobs that will suit you best.

For many people, work is a means of earning a living and nothing more. There's nothing wrong with that, certainly. But there *are* other satisfactions that come from working. Let's examine some of the more important ones.

The company of other people might seem like an odd thing to expect from a job. But stop to think about all that school means to you. School involves more than the learning you do in a classroom. School is where you make friends and meet new people who may introduce you to new ideas and new ways of doing things.

Well, work is a lot like that. The people you spend your workday with will be important in your life. You will learn from them and socialize with them on the job and, often, after work as well. Some of them may become

Using your hands can be a source of pride and satisfaction.

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close friends. Others may try your patience and test your ability to get along with people you don't like.

Contact with other people is one of the things you'll want to think about when you start exploring careers. How important is it to you to do things with others? Do you like group projects or do you prefer to do things by yourself? Are you at ease with other people? Are you a leader? Do you enjoy helping others? You'll find questions like these in the Exploring sections that appear in the following chapters. These questions are meant to help you see how well your own strong points match the qualities you'd need for certain kinds of jobs.

Satisfaction from seeing the results of your efforts is another reason for working. Can you guess what a carpenter has in common with a jeweler, a machinist, and a chef? All of them make or create something you can see, or touch, or taste. For many people, using their hands and working with things is a source of pride and satisfaction. As you examine your own interests and abilities, try to determine just how important that is to you. There are many opportunities in the world of work for people who are good with their hands and like working with things.

Some people choose jobs that give them a chance to do something useful for society. Many people have a strong desire to put their talents and efforts into something that promotes the common good. Police officers, teachers, public health officials, and wildlife conservation officers are just a few of the people who work for society as a whole.

Other people look for ways to express their creative abilities. Creating something that is uniquely their own may be more important to them than the conventional idea of success. Some of these people find a niche in the sometimes glamorous and often insecure worlds of the theater, dance, music, art, fashion, writing, or publishing.

Some people look for jobs that permit them to be physically active all day long. Others look for ways to work outdoors. Steel workers, construction workers, loggers, dockworkers, miners, and foundry workers all have jobs that call for endurance and stamina. These workers may have to lift heavy objects, work at dizzying heights, spend hour after hour in cramped positions, or constantly move around as they do their jobs. They take pride in the physical demands of their work.

Self-esteem is an important reason for working. What does that mean, exactly? Well, let's go back to school for a comparison. You know the feeling you get when the team you're on beats a rival. The recognition and acclaim give you a lift. It makes you proud of winning and glad you worked so hard. It's much the same thing on the job. If you are good at what you do, and other people appreciate and respect your work, chances are that the job you have will make you feel good about yourself. That's because your job, and the way you handle it, is tied up with your view of yourself as a person. Believing that your job is worthwhile and knowing that you do it well can make you feel terrific.

Suppose you can't imagine a job being that important to you. Well, you wouldn't be alone! Many people look

Many jobs require teamwork.

elsewhere for the feeling that their lives are worthwhile. They look to their families and friends, to hobbies and leisure activities, to involvement in civic affairs. Your job can count a lot—or just a little—in your own view of yourself.

Finding Out More About Yourself

The career you choose is likely to affect many aspects of your life. It may influence the type of home you live in, the clothes you wear, the interests and hobbies you pursue, even the political beliefs you hold.

But it works both ways. Your personal values influence your career decision. When you choose a career, you're directly or indirectly making decisions about the types of people you'd like to associate with, the amount of leisure time you want, and the importance of money in your life. These decisions depend on the personal values you already hold.

The work values exercise that follows will help you clarify your feelings about work.[1]

Examining your reasons for wanting to work is a first step in finding out what you're looking for in a career. The following list takes some of the subjects we've been talking about and divides them into 33 "satisfactions" people get from their jobs.

First read the entire list. As you do, look carefully at the definitions of each "satisfaction." How important are these things to *you*? Then go over the list again. This time, rate each item on the list, using the scale below.

1 = Not important at all
2 = Not very important
3 = Reasonably important
4 = Very important

Table 1. Work Values Exercise

1. ______ *Help society:* Contribute to the betterment of the world I live in.

2. ______ *Help others:* Help other people directly, either individually or in small groups.

3. ______ *Public contact:* Have a lot of day-to-day contact with people.

4. ______ *Work with others:* Have close working relationships with a group; work as a team toward common goals.

5. ______ *Affiliation:* Be recognized as a member of an organization whose type of work or status is important to me.

6. ______ *Friendship:* Develop close personal relationships with the people I work with.

7. ______ *Competition:* Pit my abilities against others. There are clear outcomes.

8. ______ *Make decisions:* Have the power to set policy and determine a course of action.

9. ______ *Work under pressure:* Work in a situation where deadlines and high quality work are required by my supervisor.

10. ______ *Power and authority:* Control other people's work activities.

11. ______ *Influence people:* Be in a position to change other people's attitudes and opinions.

12. ______ *Work alone:* Do things by myself, without much contact with others.

13. ______ *Knowledge:* Seek knowledge, truth, and understanding.

14. ______ *Intellectual status:* Be regarded by others as a person of intellectual achievement or an expert.

15. ______ *Artistic creativity:* Do creative work in any of several art forms.

16. ______ *Creativity (general):* Create new ideas, programs, organizational structures, or anything else that has not been developed by others.

17. ______ *Aesthetics:* Have a job that involves sensitivity to beauty.

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[1] This exercise was developed by Howard E. Figler, Director of Counseling at Dickinson College, Carlisle, Pennsylvania. It appears on pp. 77–79 of *PATH: A Career Workbook for Liberal Arts Students* (Cranston, R.I., The Carroll Press, 1975.)

18. ______ *Supervision:* Have a job in which I guide other people in their work.

19. ______ *Change and variety:* Have job duties that often change or are done in different settings.

20. ______ *Precision work:* Do work that allows little tolerance for error.

21. ______ *Stability:* Have job duties that are largely predictable and not likely to change over a long period of time.

22. ______ *Security:* Be assured of keeping my job and a reasonable financial reward.

23. ______ *Fast pace:* Work quickly; keep up with a fast pace.

24. ______ *Recognition:* Be recognized for the quality of my work in some visible or public way.

25. ______ *Excitement:* Do work that is very exciting or that often is exciting.

26. ______ *Adventure:* Do work that requires me to take risks.

27. ______ *Profit, gain:* Expect to earn large amounts of money or other material possessions.

28. ______ *Independence:* Decide for myself what kind of work I'll do and how I'll go about it; not have to do what others tell me to.

29. ______ *Moral fulfillment:* Feel that my work is contributing to a set of moral standards that I feel are very important.

30. ______ *Location:* Find a place to live (town, geographic area) that matches my lifestyle and allows me to do the things I enjoy most.

31. ______ *Community:* Live in a town or city where I can get involved in community affairs.

32. ______ *Physical challenge:* Have a job whose physical demands are challenging and rewarding.

33. ______ *Time freedom:* Handle my job according to my own time schedule; no specific working hours required.

Now that you have rated each of these work values, look over your list. Select those that mean the most to you and list them on a separate piece of paper. If you can think of any other things that are very important to you, add them to the list.

What do these work values tell you about yourself? Take a closer look at them. If you consider each one as a piece of a puzzle, and then start trying to fit them together, the picture of an individual may begin to emerge—a picture of you. You can learn a lot about yourself by thinking about your values—those things in life that matter most to you. After all, it's all the things you think, feel, and believe that shape your personality and make you the unique and special person you are.

Suppose, for example, that you have chosen the work

The way you spend free time may give you a clue about yourself.

values of time freedom, creativity, and independence. Put the pieces together and what do you see? Perhaps you see a person who loses all track of time while working on a project. Someone who likes to make or create something from the very beginning to the end and wants to do that in his or her own way—not someone else's.

Take some time to think through *your* selections. You may want to share your results with your friends, teachers, or parents. Include them in this process, and you'll learn even more about yourself.

Let's continue to explore. In the preceding exercise, you had an opportunity to explore yourself. In the next activity, we're giving you an opportunity to explore the world of work by examining the characteristics of several hundred different jobs. This activity will help you understand that, depending on the job, the things you do at work vary a great deal. Jobs are no more alike than people are. It's important, therefore, to learn about the world of work as well as to learn about yourself.

The self-confidence gained from sports can help your career.

Personal Characteristics and Jobs

You may be aware that the ability to motivate people is one of your strong points. Perhaps you're a class officer. Maybe you're one of the people who's usually chosen to be in charge of a group project. Or perhaps you're the one who is able to get everyone else on a committee to do his or her fair share of the work. With these abilities, chances are that you'd be good at a job that involves persuading, instructing, leading, or directing. Such jobs include:

- Advertising worker
- Bank officer
- Lawyer
- Insurance agent
- Automobile sales worker
- Health services administrator
- Home economist
- Teacher
- College career planning and placement counselor.

You may be handy with tools. Perhaps you enjoy gardening. Maybe you recently built a bookcase or designed a cabinet for your stereo equipment. Perhaps you are working on a needlepoint project right now. With this sort of talent, there are many occupations to explore. You might want to take a closer look at jobs like these that involve working with tools:

- Machinist
- Carpenter
- Brake operator
- Surveyor
- Business machine repairer
- Jeweler
- Drafter
- Dental laboratory technician.

Do any of these jobs interest you? You'll find these and many more in the table that appears on the following pages.[2] Look for occupations with a check in column 15 to identify those that require persuading, negotiating, and teaching skills. Column 2 identifies occupations that involve the use of tools.

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[2] This is a modified version of the table originally published in "Matching Personal and Job Characteristics," by Kathy Wilson, pp. 2-13 of the Fall 1978 *Occupational Outlook Quarterly*.

Table 2 lists 19 job characteristics and matches them with nearly 300 occupations from the *Occupational Outlook Handbook*. Of course, the table is just a starting point. By matching *your* traits with those often associated with specific occupations, you can weed out jobs that don't suit you at all. You may come up with a long list of "possibles". Those are the occupations to learn more about.

A Word About This Book

The arrangement of occupations in table 2 is a key to the organization of the rest of this book. In *Exploring Careers*, the world of work has been divided into 14 groups, or clusters, of occupations. Each is covered in a separate chapter.

The major headings on the table—Industrial Production Occupations, for example—correspond to chapter titles. Each chapter features several stories plus activities keyed to the story. Thus, the chapter on Industrial Production Occupations contains stories about a bench assembler, a machinist, and a compositor. Look more closely at the table and you'll see that each of these occupations is marked with a check. There are 41 occupations altogether that are marked with a check. These are "featured" in *Exploring Careers* and there is a story and activity section for each. Every occupation in the table is written up briefly in the Job Facts at the end of each chapter.

Before you move ahead, take a few moments to look over the descriptions of the 19 job characteristics. What is meant, for example, by "competition on the job?" Does that mean it's hard to get this kind of job? Not at all. The explanation appears under item 16 below.

Job Characteristics

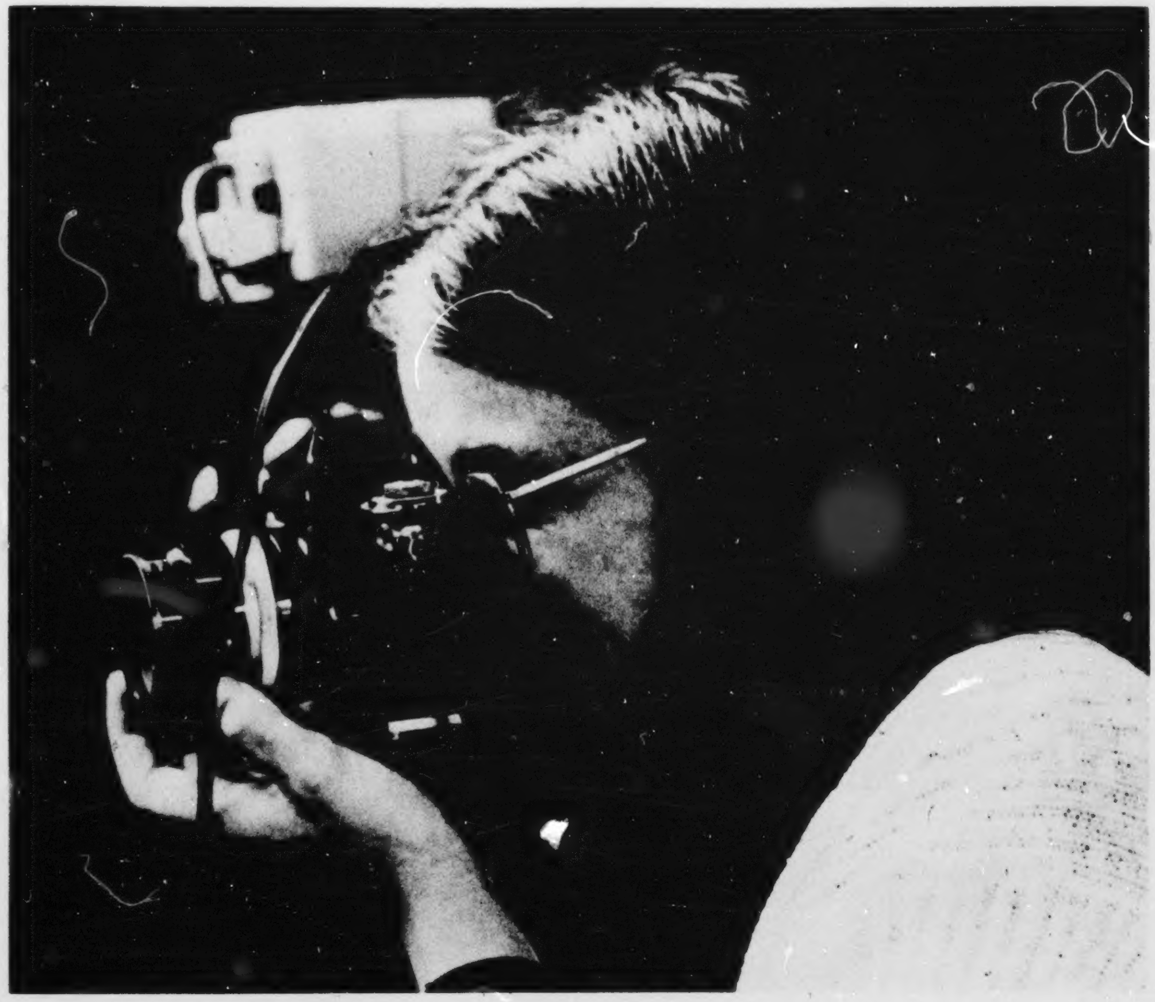
1. *Problem-solving ability*—the ability to identify a problem and then to decide what should be done to correct it. Auto mechanics, who spend much of their time fixing cars, need problem-solving ability.
2. *Uses tools, machinery*—takes a talent for working with your hands. Often, knowing how machines work is necessary, too. Tool-and-die makers, who use machine tools and precision measuring instruments to produce other tools and metal forms, need skill in this area.
3. *Instructs others*—the quality of helping others learn how to do or understand something. Receptionists and hotel clerks help others in this way.
4. *Repetitious*—work in which the same thing is done over and over again. An assembler who works on a production line does repetitious work.
5. *Hazardous*—involves the use of dangerous equipment or materials or work in dangerous surroundings. Elevator constructors, who work at great heights, have hazardous jobs.
6. *Outdoors*—refers to occupations in which a major portion of time is spent outdoors, frequently without regard to weather conditions. Roofers, who apply roofing materials to the tops of buildings, work outdoors.
7. *Physical stamina required*—able to lift heavy weights, walk long distances, stand for long periods, or stoop frequently. Bricklayers, police officers, and chefs all need physical stamina.
8. *Generally confined*—workers have to stay in one place most of the time. Truckdrivers who sit behind the wheel for many hours and statistical clerks who do their work at a desk for most of the day are examples.
9. *Precision*—work involves high standards of accuracy. Accountants, air traffic controllers, and machinists are examples.
10. *Works with detail*—refers to technical data, numbers, or written materials. Machinists who consult blueprints or written specifications before making each machined product and programmers who write instructions for the computer are examples.
11. *Frequent public contact*—work involves day-to-day contact with people who need information or service. Automobile service advisers, receptionists, hotel clerks, bank tellers, waiters, and barbers are all examples.
12. *Part time*—refers to occupations in which many workers are employed for fewer than 35 hours a week. Waiters and waitresses and real estate agents are examples.
13. *Able to see results*—refers to jobs that produce an actual product or accomplishment. Bricklayers, chefs, and choreographers all see results.
14. *Creativity*—work involves new ideas, programs, designs, or products. Writers, industrial designers, and engineers are examples of the many different kinds of workers whose jobs require creativity.
15. *Influences others*—the ability to stimulate others to think or act in a certain way. Automobile sales workers who influence customers to buy and teachers who inspire students to learn are examples.

16. *Competition on the job*—refers to occupations in which competition with co-workers for recognition or advancement is an integral part of the job. College teachers who compete for tenure, securities sales workers who compete for commissions, and models who compete for assignments are all examples.

17. *Works as part of a team*—refers to occupations in which cooperation with co-workers is an integral part of the job. Instrument makers, who work closely with scientists and engineers to translate designs into models, and school counselors, who work closely with other staff members, are examples.

18. *Jobs widely scattered*—occupations that are found in most parts of the country. Occupations that do not have a dot in this space tend to be highly concentrated in one or a few geographic locations. For example, secretaries work throughout the country while petroleum engineers work mostly in the oil-producing States of Texas, Oklahoma, Louisiana, and California.

19. *Initiative*—jobs that demand the ability to determine on one's own what should be done, as well as the motivation to do it without close supervision. Lawyers and newspaper reporters need initiative.



A career may offer the opportunity to express creative abilities.

Exploring Careers

Table 2. Personal Characteristics and Jobs

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
INDUSTRIAL PRODUCTION OCCUPATIONS																			
Foundry occupations																			
Patternmarkers		●					●	●	●	●			●					●	
Molders		●		●	●		●	●					●					●	
Coremakers		●		●			●	●		●			●					●	
Machining occupations																			
√ All-round machinists	●	●			●		●	●	●	●			●					●	
Instrument makers (mechanical)	●	●			●			●	●	●			●	●			●		●
Machine tool operators	●	●		●	●		●	●	●	●			●					●	
Setup workers (machine tools)	●	●			●			●	●	●			●					●	
Tool-and-die makers	●	●			●		●	●	●	●			●					●	
Printing occupations																			
√ Compositors		●						●	●	●								●	
Lithographers		●						●	●	●			●	●				●	
Photoengravers		●						●	●	●			●						
Electrotypers and stereotypers		●		●			●	●		●			●					●	
Printing press operators		●		●	●		●	●										●	
Bookbinders and bindery workers		●		●	●		●	●					●						
Other industrial production and related occupations																			
√ Assemblers		●		●				●	●								●		
Automobile painters																			
Blacksmiths		●		●	●		●		●			●	●					●	
Blue-collar worker supervisors	●		●							●					●		●	●	●
Boilermaking occupations	●	●		●	●		●		●	●			●					●	
Boiler tenders		●			●		●											●	
Electroplaters		●		●	●			●	●				●						
Forge shop occupations		●		●	●		●		●				●						
Furniture upholsterers		●		●			●	●					●	●				●	
Inspectors (manufacturing)	●	●		●				●	●	●								●	
Millwrights	●	●			●		●		●	●			●					●	
Motion picture projectionists		●		●				●				●						●	
Ophthalmic laboratory technicians		●		●				●	●									●	
Photographic laboratory occupations		●		●				●										●	
Power truck operators		●		●	●	●	●	●										●	
Production painters		●		●	●		●	●	●				●					●	
Stationary engineers	●	●			●		●											●	
Wastewater treatment plant operators	●	●				●			●	●								●	●
Welders		●		●	●	●	●		●				●					●	
OFFICE OCCUPATIONS																			
Clerical occupations																			
Bookkeeping workers				●				●	●	●		●	●				●	●	
Cashiers				●				●	●	●	●	●						●	
Collection workers				●				●		●	●				●		●	●	●
File clerks				●						●		●					●	●	
Office machine operators		●		●				●	●	●	●						●	●	
Postal clerks		●		●			●	●		●								●	
Receptionists			●	●				●		●	●	●					●	●	
Secretaries and stenographers				●				●	●	●		●	●				●	●	

Table 2. *Continued*

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
Shipping and receiving clerks		●		●			●			●							●	●	
Statistical clerks				●				●	●	●							●	●	
Stock clerks		●		●			●			●							●	●	
Typists				●				●	●	●		●	●					●	
Computer occupations																			
Computer operating personnel	●	●		●				●	●	●							●	●	
√ Programmers	●							●	●	●							●	●	
Systems analysts	●		●						●	●									●
Banking occupations																			
Bank clerks				●				●	●	●							●	●	
√ Bank officers	●		●					●	●	●	●				●		●	●	●
Bank tellers				●				●	●	●	●	●					●	●	
Insurance occupations																			
Actuaries	●							●	●	●								●	
Claim representatives	●		●				●		●	●	●						●	●	
Underwriters	●							●	●	●								●	
Administrative occupations																			
Accountants	●		●					●	●	●							●	●	
Advertising workers	●									●	●		●	●	●	●	●		
Buyers	●									●						●	●	●	
City managers	●		●							●	●			●			●	●	●
Credit managers	●		●					●	●	●	●						●	●	
Industrial traffic managers	●									●							●	●	
Lawyers	●		●							●	●			●	●	●	●	●	
Market research workers	●								●	●				●			●	●	
Personnel and labor relations workers	●		●							●	●			●			●	●	
√ Planners	●									●	●		●	●	●		●	●	
Public relations workers	●									●	●			●	●	●	●		
Purchasing agents	●									●							●	●	
SERVICE OCCUPATIONS																			
Cleaning occupations																			
√ Building service workers		●		●			●					●						●	
Pest controllers		●			●		●				●							●	
Food service occupations																			
Bartenders							●	●			●	●					●	●	
√ Chefs		●					●	●				●	●	●			●	●	
Dining room attendants and dishwashers				●			●				●	●					●	●	
Food counter workers				●			●	●			●	●					●	●	
Meatcutters		●		●	●		●	●			●		●					●	
Waiters and waitresses				●			●				●	●					●	●	
Hotel occupations																			
Bellhops and bell captains				●			●				●	●					●	●	
√ Hotel clerks	●			●				●		●	●						●	●	
Hotel housekeepers and assistants		●		●			●			●	●							●	
Hotel managers and assistants	●		●				●			●	●				●		●	●	
Personal service occupations																			
Barbers		●		●			●	●			●	●	●	●				●	
Cosmetologists		●		●			●	●			●	●	●	●			●	●	
Funeral directors and embalmers	●				●		●				●		●				●	●	

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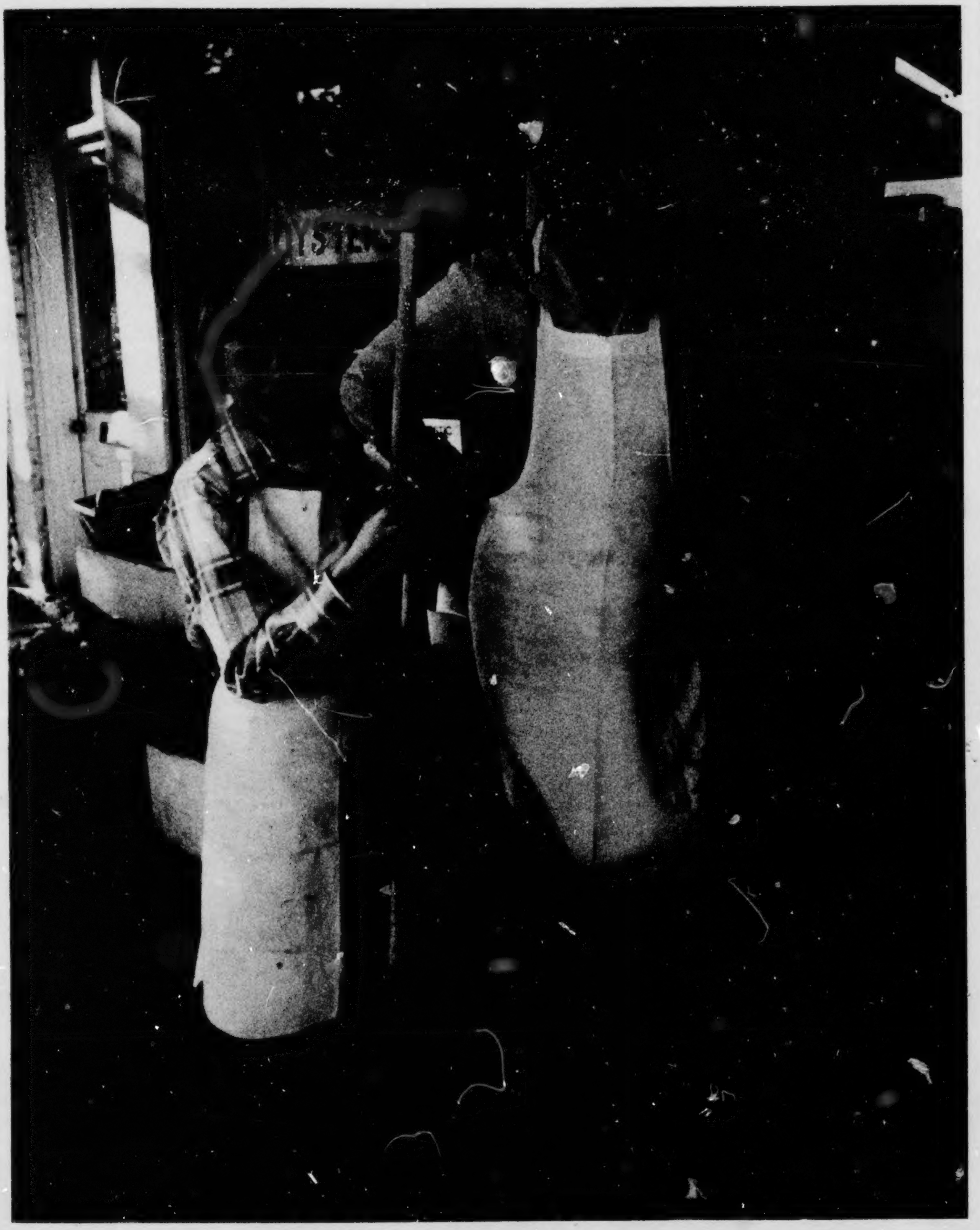

Some jobs involve meeting the public.

Table 2. *Continued*

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
Private household occupations																			
Private household workers		•		•			•					•						•	
Protective service occupations																			
Correction officers			•	•	•		•	•		•								•	
FBI special agents	•		•		•				•	•	•							•	
Firefighters	•	•	•		•	•	•												
Guards				•	•		•	•										•	
√ Police officers	•		•		•	•	•			•								•	
State police officers	•		•	•	•	•	•			•								•	
Construction inspectors	•		•		•	•			•	•								•	
Health and regulatory inspectors	•		•		•				•	•								•	
Occupational safety and health workers	•		•		•				•	•								•	
Other service occupations																			
Mail carriers				•		•	•				•							•	
Telephone operators		•	•	•				•			•							•	
EDUCATION OCCUPATIONS																			
School occupations																			
Kindergarten and elementary school teachers	•		•							•	•			•	•		•	•	
Teacher aides			•							•	•	•			•		•	•	
√ Secondary school teachers	•		•							•	•			•	•		•	•	
√ School counselors	•		•							•	•			•	•		•	•	
College occupations																			
College and university teachers	•		•							•	•			•	•	•	•	•	
College student personnel workers	•		•							•	•				•		•	•	
College career planning and placement counselors	•		•							•	•			•	•		•	•	
Library occupations																			
√ Librarians	•		•							•	•			•	•		•	•	
Library technicians and clerks			•							•	•	•					•	•	
SALES OCCUPATIONS																			
√ Automobile parts counter workers			•	•			•				•							•	
Automobile sales workers											•	•			•	•		•	
Automobile service advisers	•		•				•				•						•	•	
√ Gasoline service station attendants		•	•	•	•	•	•				•	•						•	
Insurance agents and brokers	•		•							•	•	•			•	•		•	
Manufacturers' sales workers	•									•	•				•	•		•	
Models				•			•				•					•	•		
Real estate agents and brokers	•		•			•				•	•	•			•	•		•	
Retail trade sales workers				•			•				•	•			•	•		•	
Route drivers				•		•					•				•	•		•	
√ Securities sales workers	•		•						•	•	•	•			•	•		•	
Travel agents	•		•							•	•				•	•		•	
Wholesale trade sales workers	•									•	•				•	•		•	
CONSTRUCTION OCCUPATIONS																			
√ Bricklayers	•	•			•	•	•						•	•				•	
√ Carpenters	•	•			•	•	•						•	•				•	
Cement masons and terrazzo workers		•			•	•	•						•				•	•	
Construction laborers		•			•	•	•						•				•	•	
Drywall installers and finishers		•		•	•		•						•					•	
Electricians	•	•			•	•	•		•				•					•	
Elevator constructors	•	•			•		•		•				•					•	

Table 2. *Continued*

	Problem-solving ability	Uses tools, machinery	Instructs others	Repetitious	Hazardous	Outdoors	Physical stamina required	Generally confined	Precision	Works with detail	Frequent public contact	Part time	Able to see results	Creativity	Influences others	Competition on the job	Works as part of a team	Jobs widely scattered	Initiative
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Floor covering installers		●		●			●				●		●					●	
Glaziers	●	●			●	●	●		●				●				●	●	
Insulation workers		●		●	●		●						●					●	
Ironworkers		●			●	●	●						●				●	●	
Lathers		●		●									●					●	
Operating engineers	●	●		●	●	●	●						●					●	
Painters and paperhangers		●		●	●	●	●				●		●					●	
Plasterers		●					●						●					●	
√ Plumbers	●	●			●	●	●		●		●		●					●	
Roofers		●		●	●	●	●						●				●	●	
Sheet-metal workers	●	●			●		●		●				●					●	
Tilesetters		●					●						●					●	
TRANSPORTATION OCCUPATIONS																			
Air transportation occupations																			
√ Air traffic controllers	●		●					●	●	●							●	●	●
Airplane mechanics	●	●			●	●	●		●				●				●	●	
Airplane pilots	●	●						●	●								●	●	●
Flight attendants			●	●			●				●						●		
Reservation, ticket, and passenger agents	●		●	●				●		●	●						●	●	
Merchant marine occupations																			
Merchant marine officers	●	●	●		●	●		●		●							●		●
Merchant marine sailors		●		●	●	●	●	●									●		
Railroad occupations																			
Brake operators		●		●	●	●	●										●	●	
√ Conductors	●		●	●													●	●	●
Locomotive engineers	●	●		●				●									●	●	
Shop trades	●	●			●	●	●										●	●	
Signal department workers	●	●				●			●				●				●	●	
Station agents	●		●	●				●		●	●						●	●	
Telegraphers, telephoners, and tower operators				●				●									●	●	
Track workers		●			●	●	●						●				●	●	
Driving occupations																			
Intercity busdrivers		●		●				●			●							●	
√ Local transit busdrivers		●		●				●			●							●	
Local truckdrivers		●		●				●										●	
Long-distance truckdrivers		●		●				●										●	
Parking attendants		●		●		●	●	●			●	●						●	
Taxicab drivers		●		●		●		●			●	●						●	
SCIENTIFIC AND TECHNICAL OCCUPATIONS																			
Life science occupations																			
√ Biochemists	●	●							●	●				●				●	●
Life scientists	●	●							●	●				●				●	●
Physical scientists																			
Astronomers	●	●							●	●				●				●	●
Chemists	●	●							●	●				●				●	●
Food scientists	●	●							●	●				●				●	●
Physicists	●	●							●	●				●				●	●
Environmental scientists																			
Geologists	●	●				●			●	●				●				●	●

Table 2. *Continued*

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
Geophysicists	•	•				•				•				•				•	
Meteorologists	•	•								•				•				•	
Oceanographers	•	•				•				•				•					
Mathematics occupations																			
Mathematicians	•									•				•				•	
Statisticians	•									•				•				•	
Engineers																			
Aerospace	•									•				•					
Agricultural	•									•				•				•	
Biomedical	•									•				•				•	
Ceramic	•									•				•				•	
Chemical	•									•				•				•	
Civil	•									•				•				•	
√ Electrical	•									•				•				•	
Industrial	•									•				•				•	
Mechanical	•									•				•				•	
Metallurgical	•									•				•				•	
Mining	•									•				•				•	
Petroleum	•									•				•					
Technicians																			
√ Broadcast technicians	•	•						•		•								•	
Drafters		•		•				•		•								•	
Engineering and science technicians	•	•								•								•	
Surveyors		•				•				•								•	
MECHANICS AND REPAIRERS																			
Air-conditioning, refrigeration, and heating mechanics	•	•			•													•	
Airplane mechanics	•	•			•	•												•	
Appliance repairers	•	•			•													•	
Automobile body repairers	•	•			•			•										•	
√ Automobile mechanics	•	•			•			•										•	
Boat-engine mechanics	•	•			•			•										•	
Bowling-pin-machine mechanics	•	•		•	•			•										•	
Business machine repairers	•	•			•													•	
√ Computer service technicians	•	•			•													•	
Diesel mechanics	•	•			•			•										•	
Electric sign repairers	•	•			•	•												•	
Farm equipment mechanics	•	•			•	•												•	
Industrial machinery repairers	•	•			•													•	
Instrument repairers	•	•			•													•	
√ Jewelers	•	•		•	•			•						•				•	
Locksmiths	•	•			•													•	
Maintenance electricians	•	•			•													•	
Motorcycle mechanics	•	•			•			•										•	
Piano and organ tuners and repairers	•	•			•							•						•	
Shoe repairers	•	•		•	•			•										•	
Television and radio service technicians	•	•			•													•	
Truck mechanics and bus mechanics	•	•			•			•										•	
Vending machine mechanics	•	•		•	•													•	
Watch repairers	•	•			•			•										•	
Telephone craft occupations																			
Central office craft occupations	•	•			•													•	

The ability to solve problems is important in many jobs.

Table 2. *Continued*

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
Central office equipment installers	●	●			●		●		●				●					●	
Line installers and cable splicers	●	●			●	●	●		●									●	
Telephone and PBX installers and repairers	●	●			●		●		●									●	
HEALTH OCCUPATIONS																			
Medical practitioners																			
Chiropractors	●	●	●				●		●	●	●	●	●		●		●	●	
Optometrists	●	●	●				●		●	●	●	●	●		●		●	●	
Osteopathic physicians	●	●	●		●		●		●	●	●		●		●		●	●	
Physicians	●	●	●		●		●		●	●	●		●		●		●	●	
Podiatrists	●	●	●		●		●		●	●	●		●		●		●	●	
Veterinarians	●	●	●		●		●		●	●	●		●		●		●	●	
Dental occupations																			
Dentists	●	●	●						●		●		●		●		●	●	
Dental assistants		●	●	●						●	●	●					●	●	
Dental hygienists		●	●	●				●			●	●	●				●	●	
Dental laboratory technicians	●	●		●				●	●				●					●	
Nursing occupations																			
√ Registered nurses	●	●	●		●		●		●	●	●	●	●		●		●	●	
Licensed practical nurses		●	●		●		●		●	●	●	●	●					●	
Nursing aides, orderlies, and attendants		●	●	●	●		●				●	●						●	
Therapy and rehabilitation occupations																			
Occupational therapists	●	●	●							●	●		●	●	●		●	●	
Occupational therapy assistants and aides		●	●								●	●	●				●	●	
√ Physical therapists	●	●	●				●			●	●		●	●	●		●	●	
Physical therapist assistants and aides		●	●				●				●		●		●		●	●	
Speech pathologists and audiologists	●	●	●						●	●	●		●	●	●		●	●	
Medical technologist, technician, and assistant occupations																			
Electrocardiograph technicians		●	●	●					●	●	●	●					●	●	
Electroencephalographic technologists and technicians		●	●	●						●	●						●	●	
Emergency medical technicians	●	●	●		●	●	●		●	●	●							●	
√ Medical laboratory technologists		●		●	●			●	●	●							●	●	
Medical record technicians and clerks				●				●	●	●								●	
Operating room technicians		●	●		●				●	●	●							●	
Optometric assistants		●	●						●	●	●							●	
Radiologic (X-ray) technologists		●	●		●				●	●	●	●						●	
Respiratory therapy workers		●	●						●	●	●							●	
Other health occupations																			
Dietitians	●		●							●	●	●		●			●	●	
Dispensing opticians		●	●						●	●	●							●	
Health services administrators	●									●				●				●	
Medical record administrators	●								●	●								●	
Pharmacists	●		●					●	●	●	●							●	
SOCIAL SCIENTISTS																			
Anthropologists	●		●[1]							●				●				●	
Economists	●		●[1]							●				●				●	
Geographers	●	●	●[1]							●				●				●	
√ Historians	●		●[1]							●				●				●	
√ Political scientists	●		●[1]							●				●				●	

[1] Teachers only.

Table 2. *Continued*

	Problem-solving ability	Uses tools, machinery	Instructs others	Repetitious	Hazardous	Outdoors	Physical stamina required	Generally confined	Precision	Works with detail	Frequent public contact	Part time	Able to see results	Creativity	Influences others	Competition on the job	Works as part of a team	Jobs widely scattered	Initiative
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Psychologists	●		●							●	●			●				●	●
Sociologists	●		(1)							●	●			●				●	●
SOCIAL SERVICE OCCUPATIONS																			
Counseling occupations																			
School counselors	●		●							●	●			●	●		●	●	●
College career planning and placement counselors	●		●							●	●			●	●		●	●	●
Employment counselors	●		●					●		●	●		●		●		●	●	●
Rehabilitation counselors	●		●							●	●			●	●		●	●	●
Clergy																			
√ Protestant ministers	●		●								●			●	●	●	●	●	●
Rabbis	●		●								●			●	●	●	●	●	●
Roman Catholic priests	●		●								●			●	●		●	●	●
Other social service occupations																			
Cooperative extension service workers	●		●								●		●		●		●	●	●
Home economists	●		●								●			●	●		●	●	●
Homemaker-home health aides			●								●				●			●	●
Park, recreation, and leisure service workers	●		●			●	●				●	●		●	●		●	●	●
Social service aides	●		●	●							●	●					●	●	●
√ Social workers	●		●								●		●	●	●		●	●	●
PERFORMING ARTS, DESIGN, AND COMMUNICATIONS OCCUPATIONS																			
Performing artists																			
Actors and actresses			(1)				●				●	●		●		●	●		●
Dancers			(1)				●				●			●		●	●		●
√ Musicians			(1)				●		●		●	●		●		●	●		●
Singers			(1)				●				●			●		●	●		●
Design occupations																			
√ Architects	●	●							●	●	●		●	●		●	●	●	●
Commercial artists		●								●			●	●		●	●	●	●
Display workers		●											●	●	●			●	●
Floral designers								●			●		●	●				●	
Industrial designers	●								●	●			●	●			●	●	●
Interior designers										●	●		●	●		●	●	●	●
Landscape architects	●									●	●		●	●				●	●
Photographers											●		●	●		●		●	●
Planners	●									●	●		●	●			●	●	●
Communications occupations																			
Advertising workers	●									●	●		●	●	●	●	●		●
Interpreters			●						●		●								●
√ Newspaper reporters			●						●	●	●		●	●	●	●		●	●
Public relations workers	●									●	●			●	●	●	●	●	●
Radio and television announcers			●					●			●			●	●	●		●	●
Technical writers	●		●					●	●	●			●	●			●	●	●
AGRICULTURE, FORESTRY, AND FISHERY OCCUPATIONS																			
Agricultural production occupations																			
√ Farmers	●	●			●	●	●						●				●	●	●
Farm managers	●		●		●	●	●						●		●		●	●	●
Farm laborers		●		●	●	●	●						●				●	●	●
Farm labor supervisors	●		●		●	●	●						●		●		●	●	●
Agricultural support occupations																			

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[1] Teachers only.

Table 2. *Continued*

	Problem-solving ability 1	Uses tools, machinery 2	Instructs others 3	Repetitious 4	Hazardous 5	Outdoors 6	Physical stamina required 7	Generally confined 8	Precision 9	Works with detail 10	Frequent public contact 11	Part time 12	Able to see results 13	Creativity 14	Influences others 15	Competition on the job 16	Works as part of a team 17	Jobs widely scattered 18	Initiative 19
√ Cooperative extension service workers	●		●								●		●		●		●	●	●
Soil conservationists	●		●			●							●					●	●
Soil scientists	●								●	●								●	●
Range managers	●				●	●	●										●	●	●
Agricultural engineers	●								●	●			●	●			●	●	●
Food scientists	●								●	●				●			●	●	●
Farm equipment mechanics	●	●			●	●	●		●				●					●	
Buyers and shippers, farm products	●										●				●	●		●	●
Veterinarians	●	●	●		●				●	●	●		●		●		●	●	●
Forestry occupations																			
√ Foresters	●				●	●	●										●	●	●
Forestry technicians		●			●	●	●										●	●	
Loggers		●		●	●	●	●						●				●		
Fishery occupations																			
Fishers	●	●		●	●	●	●	●					●			●	●		●
Fish farmers	●	●				●	●						●				●		●

[1] Teachers only.

Some people look for a career with excitement and adventure.

School and Work

So far, you've heard a lot about the importance of career exploration. You know that finding out about yourself is the first step. You've discovered that different kinds of jobs suit different people. The right kind of career depends on the person you really are—or want to be.

You've completed the work values exercise. You may have a clearer picture now of your reasons for working—and a better idea of the things about a job that matter to you.

The table on personal and job characteristics may have helped you narrow down the occupations to those that appeal to you the most.

Now let's look at another way of exploring careers, one that involves your school subjects. First, decide what your favorite subject is. Then list the subjects that come easily for you. *If you like a subject and do well in it, it's worth investigating occupations that involve that subject.*

We'll use mathematics as an example. (You may have chosen English or science or industrial arts.) Some of the jobs in which you'd use mathematics are written up in this book: Bricklayer, carpenter, plumber, machinist, air traffic controller, medical technologist, biochemist, electrical engineer, architect, computer programmer/systems analyst, computer service technician, bank officer, securities sales worker, and forester. There are stories and activities in *Exploring Careers* for each of these occupations. And these are just a few of the occupations that require either practical or theoretical ability in mathematics. Your teacher or counselor can direct you to more.

Suppose you are uncomfortable and confused in math class and don't like the subject at all. Does that mean you have to rule out a career in construction, or health, or forestry? Not necessarily. But it does require some more digging on your part. You need to be honest with yourself. Is it the subject matter you dislike, or is something else influencing your feelings about math? Is it a particular teacher, for example, or a particular textbook? Or is it your own attitude?

It's up to you, with the aid of your teacher or counselor, to determine just how much ability in mathematics you have. It's important, too, to find out exactly how math is used in the kinds of jobs that interest you. Machinists, for example, need to be good at arithmetic to calculate quickly and make precise measurements. Systems analysts use calculus and must be able to apply mathematical theory to practical problems. Talking to people about their work and asking how they use math on the job should help you determine whether you should seriously consider work that involves the use of math. Or, whether, instead, you should rule it out.

You can also *test some of your career ideas by exploring high school subject areas in greater depth.* Say you're good at science and like to build things and work with your hands. You're aware that engineering and drafting are possible career choices. Now is the time to test your

You can test your career ideas by exploring school subjects.

interest in those and related fields. Use class assignments, projects, and science fairs to learn about the kind of work engineers and drafters actually do. If one branch of engineering in particular appeals to you, try to figure out why. Find out what engineering and scientific technicians do, and how their work fits in with that of engineers and scientists. In the Suggested Activities sections in chapter 9, you'll find ideas for things you can do—in school and on your own—to learn more about scientific and technical occupations. While you're at it, investigate the activities in other chapters of the book. With an interest in science, you'd probably find it worthwhile to learn more about the work of a computer programmer/systems analyst (chapter 3), an architect (chapter 14), or a forester (chapter 15).

Perhaps you're deeply interested in consumer issues but don't know quite where that might lead you. Try taking a home economics course and use the opportunity to find out about careers in consumer economics, food and nutrition, or clothing and textiles. Other courses that give you a good chance to explore career interests are art, music, business education, and distributive education.

Table 3 lists subjects taught in many high schools. Opposite each subject, we've listed one or more chapters of *Exploring Careers*. Use this list as a starting point.

Table 3. School Subjects and *Exploring Careers* Chapters

Subject	*Chapter*
Agriculture	Agriculture, Forestry, and Fishery Occupations
Art	Education Occupations Performing Arts, Design, and Communications Occupations
Business education	Agriculture, Forestry, and Fishery Occupations Education Occupations Office Occupations Service Occupations
Distributive education	Sales Occupations
Driver education	Transportation Occupations
Health	Health Occupations Scientific and Technical Occupations
Home economics	Agriculture, Forestry, and Fishery Occupations Education Occupations Service Occupations Social Service Occupations
Industrial arts	Agriculture, Forestry, and Fishery Occupations Construction Occupations Industrial Production Occupations Mechanics and Repairers Performing Arts, Design, and Communications Occupations Scientific and Technical Occupations Service Occupations Transportation Occupations
Language arts	Education Occupations Office Occupations Performing Arts, Design, and Communications Occupations Sales Occupations Service Occupations Social Scientists Social Service Occupations
Mathematics	Agriculture, Forestry, and Fishery Occupations Construction Occupations Health Occupations Industrial Production Occupations Office Occupations Performing Arts, Design, and Communications Occupations Sales Occupations Scientific and Technical Occupations Social Scientists
Music	Education Occupations Performing Arts, Design, and Communications Occupations
Physical education	Construction Occupations Education Occupations Health Occupations Service Occupations
Science	Agriculture, Forestry, and Fishery Occupations Education Occupations Health Occupations Industrial Production Occupations Office Occupations Scientific and Technical Occupations Social Scientists Transportation Occupations
Social studies	Education Occupations Office Occupations Performing Arts, Design, and Communications Occupations Service Occupations Social Scientists Social Service Occupations

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Suppose you believe that your true interest lies in language arts. You want to be a writer. People who have a love of language and a talent for putting words together may work as:

- Journalists
- Script writers
- Advertising workers
- Technical writers
- Greeting card writers
- Crossword puzzle writers
- Public relations workers
- Textbook editors
- Manuscript readers
- Index editors
- Literary agents
- Bookstore managers
- Publishers' representatives
- Book club sales associates
- Magazine circulation assistants.

Writing and publishing jobs aren't the only ones that require an excellent command of language, however. All sorts of people need the ability to put ideas into words so that they can influence others or get things done. Language arts are important to a lawyer writing a brief for a court case . . . to a planner writing an environmental impact statement . . . to a sales manager writing a memorandum to company executives . . . to a college teacher writing an article for a scholarly journal. All these people use language arts on the job every day. Get some new ideas about careers that use language arts by browsing through the chapters that appear opposite "Language arts" in table 3. Each chapter, in turn, will give you ideas for further exploration.

The Training You'll Need

Do you have any idea of how you might go about becoming a secretary? A carpenter? A computer programmer? A pilot? The first thing you'd have to do for

The best way to launch your career is to finish high school.

each of these jobs is learn a set of skills. To work as a secretary, you'd have to learn to type, take shorthand, and handle office procedures. To be a carpenter, you'd have to learn to use your tools properly and work without wasting your materials. To work as a computer programmer, you'd have to learn how to translate ideas into a language the computer could understand and instructions it could follow. To become a pilot, of course, you'd have to learn to fly a plane.

Like a hobby or a sport, every job involves knowledge and skills that you must learn. However, the amount of preparation you need varies from job to job. *Deciding how much time and effort you're willing to put into job training is an important part of career exploration.* It doesn't make sense to aim for a career as a veterinarian, for example, unless you do well in school, are interested in science, and are willing to put in 10 years or more of hard work and study after you graduate from high school.

Examine your attitude toward school. How long are you willing to stay in school? Do you plan to finish high school? Would you be willing to take job training afterwards that might might last anywhere from 6 months to 6 years? Do you plan to go to college? Are you willing to study in college for 6 or 8 years or even more? Some occupations—veterinarian is one—require that much formal education.

The cost of education or training after high school is something else to consider. You'll have to think about how much training you or your family can afford as well as how much you'd like to obtain. The cost of the schooling necessary to become a veterinarian is much greater than the cost of the training you'd need to become a medical technologist, for example. Yet both are health occupations. Within most career clusters, you'll find occupations with varying training requirements.

Bear in mind, too, that there are many sources of financial aid your counselor can help you investigate. Don't be discouraged if you have the ability to pursue education or training after high school but your family can't afford the cost. Scholarships, loans, grants, and other financial aids are available from schools, educational foundations, business firms, religious groups, community organizations, and Federal, State, and local governments. The question of how to finance your education after high school will become more important later on. For now, let's take a look at some of the different ways you could get the preparation you need for the world of work.

The best way to launch your career is to complete high school. High school courses give you a foundation in basic skills that will help you function intelligently as a worker, consumer, and citizen. A high school diploma is necessary if you want to go to college. And it's usually required for admission to trade schools, technical institutes, or apprenticeship programs. Moreover, many employers prefer to hire high school graduates.

Like a hobby or a sport, every job requires knowledge and skills that you must learn.

Chart 1 illustrates the choices that are open to you after high school. As you can see, there are a number of ways of getting the education and training you'd need for a job. You can learn a trade while you work; you can enroll in an apprenticeship program that combines on-the-job training and classroom instruction; you can attend a vocational or trade school to learn job skills from cutting hair to operating excavating equipment; you can get training and work experience in the Armed Forces; or you can prepare for a career by going to college. The path you select depends on the particular kind of career you have in mind—and the time and effort you are willing to put into your training.

As you continue to investigate careers that interest you, make a point of finding out about training—how much is required and what kind is recommended. See how well this matches your own willingness to study and learn. You'll find a summary of the training requirements for each of nearly 300 occupations in the Job Facts sections in chapters 2-15.

Training After High School

Sometimes you may get the feeling, from hearing people talk, that almost everybody gets a college education these days. That just isn't so. About half of those who graduate from high school do take some additional schooling of some kind, but not necessarily in college.

On-the-Job Training

Almost every job involves some sort of "learning by doing"—one of the major kinds of on-the-job training. Employers see to it that the people they hire have an opportunity to learn how to handle the jobs they were hired to do. This training takes many forms and can last from a few days to a year or more. Assemblers, for example, learn their skills from more experienced workers by helping and observing them and working under their supervision. Learning the job may take no more than a few hours. For other occupations, on-the-job training is more formal and includes classes in related subjects. Power truck operators, for example, take courses on safe driving that last several days. In some cases, on-the-job training continues for several years. Air traffic controllers take a 16-week course and then need 2 or 3 years of work experience before they are considered fully qualified to handle their jobs.

Almost every job involves some sort of "learning by doing."

There are many occupations in which you can learn your job as you do it. You can train on the job for careers in the following clusters:

Agriculture, Forestry, and Fishery Occupations
Construction Occupations
Industrial Production Occupations
Mechanics and Repairers
Office Occupations
Service Occupations
Transportation Occupations

Apprenticeship

Apprenticeship is a way of learning a trade that combines on-the-job training and classroom instruction. Apprenticeship programs are sponsored by unions and employers. When you have completed your apprenticeship program—in 1 to 6 years—you are formally recognized as fully qualified in your trade.

As an apprentice you are taught by experienced workers. You learn your trade by helping them and working under their supervision. Your training covers all aspects of a trade. For example, apprentice auto mechanics don't just learn how to repair engines; they also learn how to diagnose engine problems and how to care for their tools. They study such subjects as shop safety practices and customer relations in a classroom or through home study. Often, classes are held at local high schools or vocational schools.

Every year, thousands of men and women learn to become auto mechanics, carpenters, bricklayers, electricians, machinists, plumbers, pipefitters, sheet-metal workers, and tool-and-die makers through apprenticeship programs. And these are only a few of the apprenticeable trades. Through apprenticeship, you can prepare for jobs in the following career clusters:

Construction Occupations
Industrial Production Occupations
Mechanics and Repairers
Service Occupations

World of Work

Vocational and Technical Schools

Many types of schools offer vocational training—courses to learn the skills you'll use on the job. You're probably familiar with your school system's vocational education program. This is one important source of vocational training. Others include trade schools, technical institutes, business schools, and correspondence or home study schools. In classes that last from several weeks to several years, these schools will teach you cosmetology or barbering, flying, business and office procedures, computer operating, medical assisting, fashion design, commercial art, automobile mechanics, locksmithing, radio and television broadcasting, truckdriving, and many other skills.

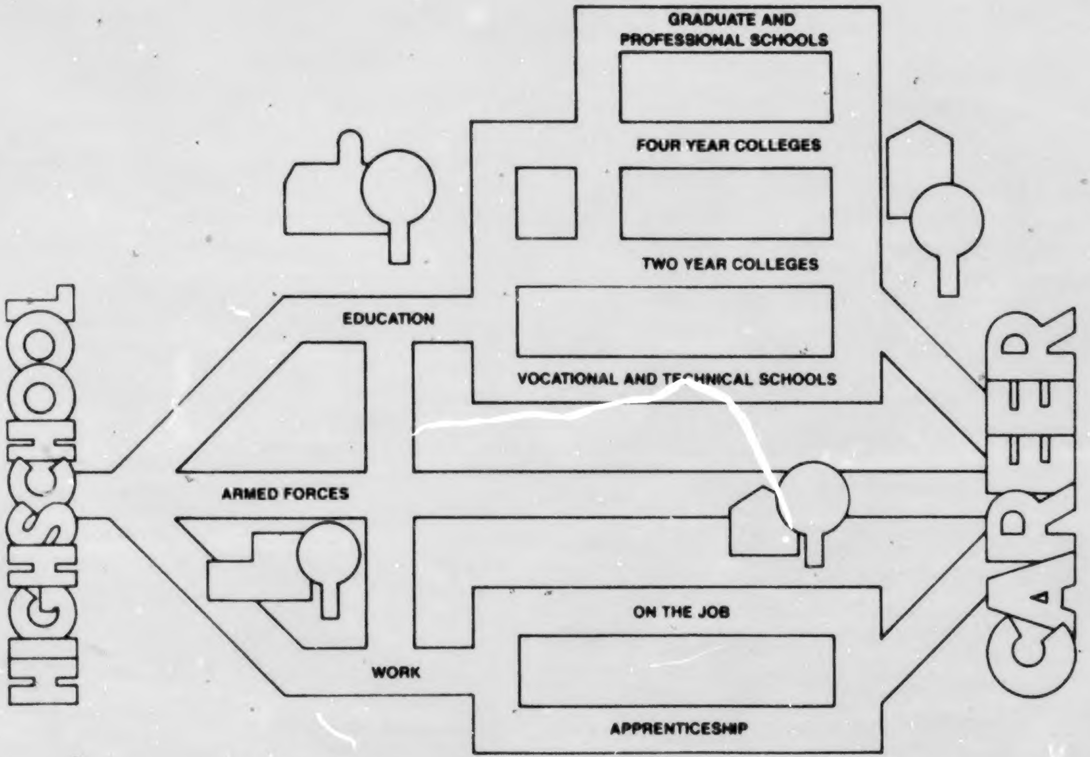
Usually you'll practice—in the classroom—things you'll be expected to do at work. In business school, you might type, file, take shorthand, or keep books. In programs for health occupations you might operate medical equipment. You'll also study subjects that will help you on the job. In programs for mechanics and repairers you would take classes in blueprint reading and shop math.

When you complete your program, you'll receive a certificate of achievement. Although your employer may also want to give you some on-the-job training, you generally are ready to begin work once you finish a vocational program.

Vocational and technical schools provide the necessary preparation for jobs in the following career clusters:

- Agriculture, Forestry, and Fishery Occupations
- Health Occupations
- Industrial Production Occupations
- Mechanics and Repairers
- Office Occupations
- Performing Arts, Design, and Communications Occupations
- Sales Occupations
- Service Occupations
- Transportation Occupations

Chart 1. Education and Training after High School



Community and Junior Colleges

In community and junior colleges, you can prepare for a specific occupation. Depending on your curriculum, you may be able to begin work for a bachelor's degree. Although the typical program lasts 2 years or more and leads to an associate degree, a number of courses can be completed within 1 year.

By attending a community or junior college, you can prepare for employment as a computer service technician, a drafter, a surveyor, a forestry technician, a nurse, an emergency medical technician, a recreation leader, a secretary, a computer programmer, an automobile mechanic, or a welder. These are just a few of the areas in which these colleges offer job training! Community colleges have close ties with local business and industry and try to tailor their occupational training programs to the needs of the local area.

The course offerings and classes are similar to those in vocational and technical schools; you are taught the skills you need on the job.

These colleges offer programs that prepare you for jobs in the following career clusters:

Agriculture, Forestry, and Fishery Occupations
Construction Occupations
Health Occupations
Industrial Production Occupations
Mechanics and Repairers
Office Occupations
Performing Arts, Design, and Communications Occupations
Scientific and Technical Occupations
Service Occupations

College and Universities

In colleges and universities, you can get a bachelor's degree with a major in one or more subjects. Your major is the subject you specialize in, such as history, mathematics, biology, business administration, or accounting. Most bachelor's degree programs require 4 years, and training for such professions as law, medicine, theology, and social work requires several additional years. "Graduate" study—that is, courses towards a master's degree or Ph.D.—is essential preparation for some occupations. And it helps your chances of getting ahead in many more.

By and large, college does not prepare you for one particular job—the way an apprenticeship does, for example. Instead, most undergraduate programs give you a foundation upon which any one of several careers can be built. In 4 years of college, you can expect to gain a basic knowledge of your field and to develop a certain intellectual discipline. You will learn to work with abstractions, to sharpen your analytical skills, and to develop your writing and speaking skills. Very often, college graduates with a bachelor's degree start out in the world of work as trainees. They are regarded as beginners, people who have the basics but still have more learning to do. As they gain experience on the job or continue their schooling, they move ahead in their careers.

A bachelor's degree is necessary for many jobs in the following career clusters:

Agriculture, Forestry, and Fishery Occupations
Education Occupations
Health Occupations
Office Occupations
Performing Arts, Design, and Communications Occupations
Scientific and Technical Occupations
Social Scientists
Social Service Occupations.

Armed Forces

Another way to prepare for a job is to join the Armed Forces. The Armed Forces train people in most of the same occupations that civilians work in—cooks, clerks, secretaries, nurses, carpenters, mechanics, newspaper reporters, photographers, meteorologists, air traffic controllers, and many more. You can learn job skills and gain work experience while you're in the service and then, when you complete your tour of duty, use these skills to get a civilian job. Veterans' benefits can help you finance further training at a vocational or technical school, or in college. You may decide to make a career of military service.

Continuing to Explore

The ideas and activities in this chapter should have helped you learn something about yourself. The rest of the book is designed to help you go on from there, to learn new things about yourself as you broaden your knowledge of the world of work. Learning about yourself is a process that will continue throughout your life. You'll keep making discoveries about things you're good at and things you like to do that will help you understand and accept yourself—your strengths and weaknesses, your needs, and your goals. Testing career interests is just one of many ways of discovering what you're really like.

World of Work

Now is the time to let your imagination soar, to test your dreams, to try all kinds of things that are new. Try to explore the world of work with a truly open mind. Don't limit yourself by examining only a few kinds of work. You'll want to begin with the fields that interest you most, of course, but don't rule out other fields too soon. Some jobs may not appeal to you simply because you're not familiar with them. They might be worth looking into. Remember, too, that you haven't wasted your time if you investigate a career only to decide that it's *not* right for you. Finding out what you don't like—and figuring out why—is important, too.

Career exploration isn't something you do just once. Taking stock of your interests is something you'll do again and again throughout your life. You will continue to change as the years go by, and as you do, your ideas of what's important and what's not will also change.

It's likely that your career interests and goals will change as well. As people grow older, their reasons for working often change, as do their long-term goals. People change jobs a lot, in fact. And most people experience periods when they don't have jobs. They may be unemployed, or they may stop working for a while in order to go to school, travel, or raise a family. Many people change jobs because they've taken a second look at their interests and abilities and decided it's time for something else. Changing jobs, training for a brand new career, or going back to school to keep up with the latest developments in your field are all things to expect once you have entered the world of work.

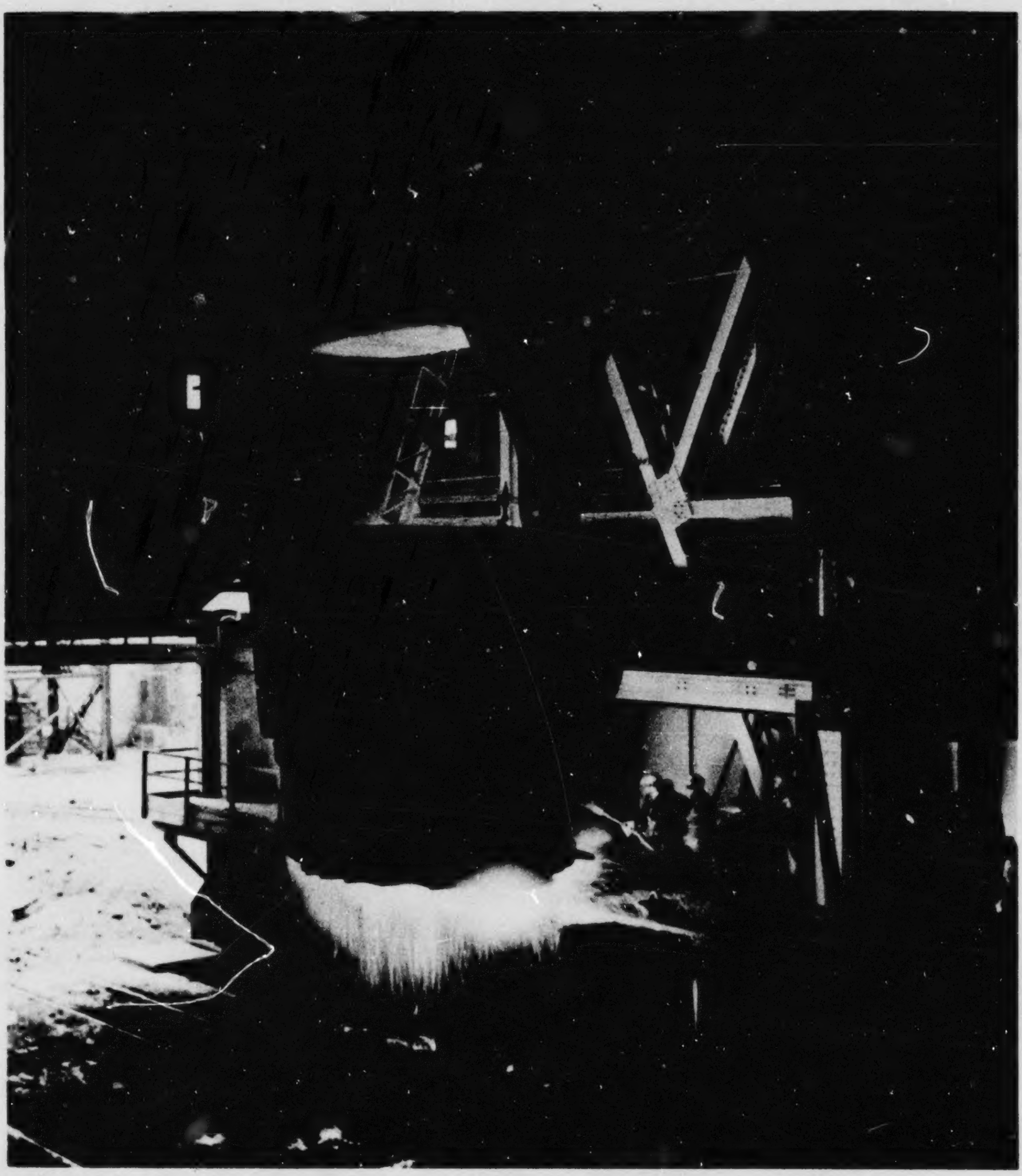
Exploring careers is important right now, as you begin getting ready to enter the world of work. It will be just as important to repeat the process later in your life—whenever the time seems right to stand back, take another look at yourself, and test your career interests.

Now is the time to let your imagination soar.

Feeling that your job is worthwhile and knowing that you do it well can make you feel terrific.

Exploring Careers

Industrial Production Occupations



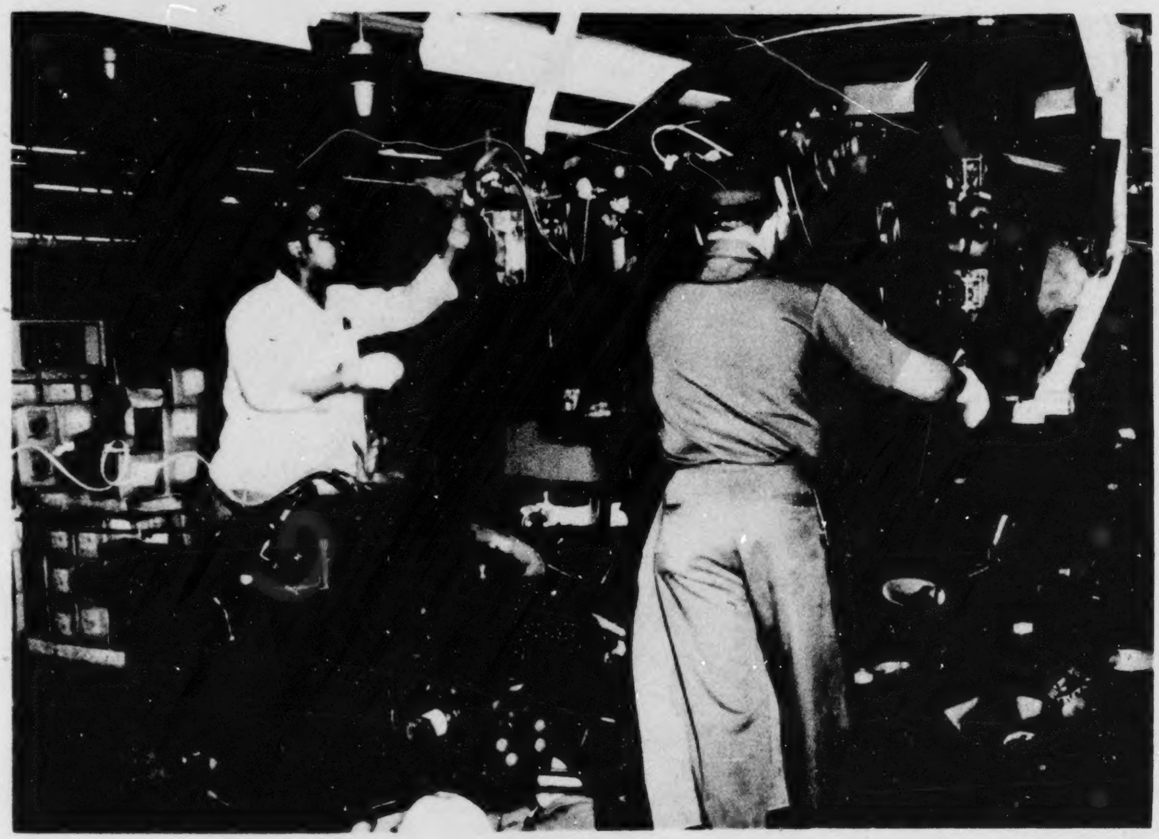
Industrial production workers deal with things more than they do with people or ideas.

Annie Bergdahl walked down the corridor, wide-eyed. From the moment she first walked through the massive brass doors of the main entrance, the Museum of Science and Industry held her in a spell. The old airplanes hanging from the ceiling, the mummies, the space capsules—everywhere she turned, Annie found wonderful things to explore. She wanted to see it all, read every word, push every button. But the museum was so big!

Most of the other youngsters on the field trip also wanted to run off and spend more time at some exhibit they had spotted. But Mr. Borden, their teacher at Middlesex Junior High, kept them together in a group. There were certain exhibits he wanted them to see, exhibits that should liven up the unit they were doing right now in his social studies class.

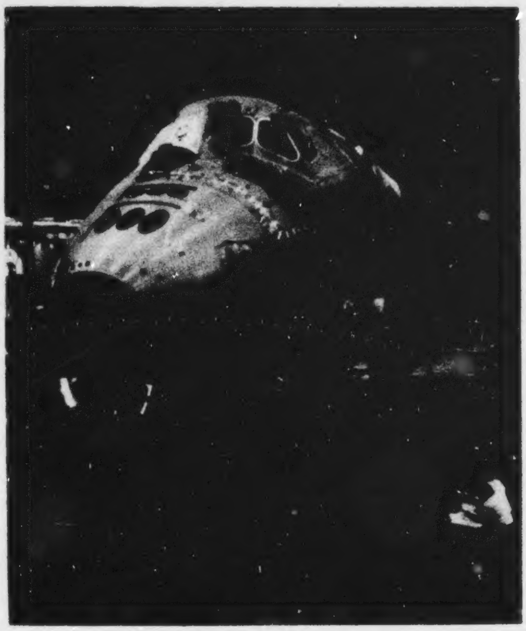
The unit on industry had begun last week, and Mr. Borden was teaching the class how factories produce goods. Some of the students were obviously bored. But not all of them . . . and certainly not Annie. Annie had enjoyed the film about an automobile assembly line. It fascinated her to watch the metal frames grow, almost magically, into complete cars as they moved along. And she couldn't believe how many workers—*assemblers,* Mr. Borden had called them—it took to build a car. Each assembler performed a single task over and over while the seemingly endless parade of unfinished automobiles marched on. As the engines glided down from above, two or three workers would bolt each one to a frame. Others attached the seats; still others added doors or side panels or wheels or a hood, over and over. Mr. Borden had said that not all assemblers work on an assembly line. Many work at benches or on shop floors and set their own pace. Nevertheless, Annie had decided that assembly work wasn't her cup of tea.

Now, at the museum, she walked with the group toward a tall archway crowned with a large sign in shiny brass letters: HALL OF INDUSTRY. Mr. Borden led the students through the archway into a large room. All



It takes many assemblers, each performing a different task, to produce an automobile.

Industrial Production Occupations



America's industrial plants produce everything from paper clips to rocket ships.

This inspector looks carefully at every television set.

around them they saw exhibits and more doorways. Ushering the group to one side of the room, Mr. Borden sat them on the carpet and introduced them to a casually dressed young man who awaited them there.

"This is Mr. Novacello, class. He works here at the museum, and he's going to tell us about the exhibits in this hall. Now, what are we studying in class these days?"

"Industrial production!" shouted half the group in unison.

"Right!" said Mr. Borden. "And who can tell me what that means?" A sudden attack of shyness paralyzed the group. There was silence until Annie raised her hand.

"Production means making things. Industrial production means making things in factories and plants."

"Very good, Annie," said Mr. Borden, smiling. "Now, let's let Mr. Novacello tell us more about it and demonstrate how some things are made."

Mr. Novacello flashed a smile and greeted the group. After telling them a bit about the museum and himself, he returned to the subject at hand. "Who can tell me why it's important to learn about industrial production?" he asked.

Silence.

"Well, then, who can name some industrial products?"

One by one, the children began to name things made in factories: Cars and trucks, trains and airplanes, books and newspapers, pencils and pens, refrigerators and radios, television sets and telephones, window glass and wallpaper, lampshades and lightbulbs, canned soups and candybars.

"The list is quite long, as you can see," said Mr. Novacello. "Industrial plants produce everything from paper clips to rocket ships. And they produce these things much more quickly, efficiently, and cheaply than was possible years ago. Today, almost every American family has a TV or an automobile or a refrigerator. Without modern industrial production, all these things would have to be built by hand, and most of us could never afford them. Modern industry makes our lifestyle possible, and so we should know something about it.

"There's another reason, too. All those products didn't appear by magic. They were made by millions of workers in a great variety of jobs. When you start thinking about the kind of job you might like when you grow up, it'll help to know about these.

"We have exhibits here that illustrate a dozen different kinds of industrial processes. I want to show you four or five that I think will interest you, and tell you a little about the work and the workers in each. Come with me to the first exhibit and we'll have a look."

Foundry Occupations

The youngsters followed Mr. Novacello over to the far wall and gathered around him before a large darkened window. Curious to know what was about to happen, they listened to him closely.

"This exhibit shows an industrial plant called a foundry. The workers there make metal parts for many different things." As he spoke, Mr. Novacello pushed a button on the wall near the glass panel. Spotlights suddenly illuminated the scene behind the glass, in which a dozen mechanical people came to life. All dressed in overalls and hard shoes, they acted out the different kinds of foundry work. At the same time, a clear, deep voice spoke from a wall speaker.

"The process used to make metal parts in a foundry is called casting," began the voice, "and it resembles the way you would mold a ring or some other shape out of gelatin in your kitchen. Workers heat the metal until it liquifies, then pour it into a mold. When it has cooled and hardened, the metal has the desired shape and is taken from the mold.

"Casting is used to make metal objects that must be very strong, such as engine blocks and axles for cars. In order to cast the desired shape, foundry workers create the molds themselves. First, the *patternmaker* creates an exact model, or pattern, of the part out of metal, wood, or perhaps plaster. Patternmakers are highly skilled workers. They make a model from a set of drawings called blueprints that give the exact measurements of the part. And since the quality of the product depends upon the quality of the pattern, patternmakers work very carefully and deliberately.

"When the pattern is finished, the *molder* uses it to make a mold. Molders pack special sand around the pattern in a box called a flask. After pressing the sand very tightly with mallets or powered rammers, they carefully remove the pattern, leaving a space in the sand exactly the shape of the final piece. This is the mold.

"Some castings have hollow sections," continued the voice. "They are formed when the liquid metal flows around a "core" that the *coremaker* creates. Coremakers start with a wood or metal block with a space hollowed out in the proper shape. After packing sand into the hollow, they bake it or dry it by some other method. Once dry, the sand core is hard enough to remove and use in casting."

Fascinated by the mechanical figures, the children stared for another minute or so while the voice described other aspects of a foundry. Then the display went dark and the speaker silent. Mr. Novacello's voice broke the trance.

Steel workers may have to wear special clothing for protection.

Foundry workers make metal objects that must be very strong. Here the worker is pouring liquified metal into a mold.

"If you'll follow me over to the next display, we'll see some other kinds of workers who make things out of metal."

Other Metalworking Occupations

Leading the children to a large floor-to-ceiling display case, he pointed to the first of several life-sized figures posing behind the glass. "Now," he began, "who can tell me the occupation of this man standing at the anvil with a big hammer in his hand?"

"Blacksmith!" answered the class in unison.

"Right!" said Mr. Novacello. "And what do blacksmiths do?"

"They put shoes on horses," answered a few voices.

The guide smiled. "That's partly correct. Many blacksmiths specialize in shoeing horses and are called *farriers.* But blacksmiths also make or mend metal objects for many other purposes. The process they use is called forging. First, they soften a piece of metal, usually iron, by heating it in a fireplace called a forge. Next, holding it on the anvil with a pair of tongs, they strengthen and shape the metal by hammering and chiseling it. Then they cool it in water.

"This blacksmith is forging metal in essentially the same way that his predecessor did a hundred years ago. Even his tools are similar. In a modern *forge shop,* you would find workers who look like these next figures in the case. They heat the metal in a furnace and use large power hammers and presses to pound and squeeze it into the desired shape. With their equipment they can produce objects such as keys, wrenches, drill bits, or huge parts for heavy machinery. And they can do it much faster than a blacksmith.

"Now this occupation," continued Mr. Novacello, indicating the next figure, "may be harder to figure out. As you can see, this woman is placing a metal object in a vat of liquid. An electrical wire is connected to the object, and another runs into the liquid. Can anyone tell me what she's doing?"

Mr. Novacello looked out across a sea of blank faces. "Do you all give up? This woman is an *electroplater.* She puts a metal layer, or plating, on an object. She does this by passing an electric current between the plating material, which can be silver, chromium, or some other metal, and the object. She covers those parts of the object that aren't to be plated, and she carefully controls the strength and duration of the current. Then she checks the plating to make sure it was applied evenly and in the right thickness. In this display she is putting chrome plating on an automobile bumper, but she could be plating any of the shiny, silvery parts of a car.

"The next occupation might be a bit easier. Two people wearing face masks are standing over a metal object, while one holds a torch to it. What do you think they're doing?"

Silence.

"I thought you'd guess this one," said the guide. "These are *welders.* They use heat from gas or electric

This welder is using heat from an acetylene torch to join pieces of metal.

An artificial limb doesn't prevent this worker from pursuing his trade as a welder.

torches to join pieces of metal together. These two work in a plant where bulldozers are made. They're joining two pieces of the bulldozer frame together. Welders also work in factories that make trucks, boilers, and all kinds of heavy machinery. But you see welders at work just about everywhere, not just in factories. They work on bridges, roads, pipelines, and construction sites, joining the metal beams and steel reinforcing rods that make those structures so strong. And they work on ships. Ship welders have to be highly skilled and they have to do their jobs very carefully indeed, to be sure that the ship doesn't break apart in rough seas. But that's enough for today about welders!

"Now let's look at these last workers in the display. They are demonstrating three different steps in *boilermaking.* The first worker measures and cuts all the pieces from metal, according to the blueprints. These measurements must be precise, because it may be impossible to correct a bad cut. The next worker joins the pieces together temporarily to see if they fit properly. It may be necessary to grind or cut in places to make a good fit. Then the last worker assembles the boiler by welding or riveting the pieces together. Small boilers, like the one shown here, may be assembled in the shop, but large ones, such as those that supply steam to drive turbines in electric power plants and in ships, must be put together in place. Any questions?"

Boilermakers need mechanical aptitude and manual dexterity.

Several in the group raised questions, which Mr. Novacello answered as best he could. Then he led them to another corner of the hall.

"So far we've seen occupations related to metal products. Now let's look at workers who make something entirely different, something you all use every day in school—books."

Printing Occupations

"Most people in this country today read and own books," continued Mr. Novacello. "But hundreds of years ago books were handwritten, and only the very rich could afford them. And of course in those days, ordinary people didn't know how to read. With the invention of the printing press and movable type, books became much easier and cheaper to print. More people bought them and learned to read them. So those of you who love reading can be grateful to the people who invented the processes we're about to see!"

Following their guide through a wide doorway, the children found themselves on a long balcony overlooking a huge factory in miniature. When they had spread themselves out along the railing to get a better view, Mr. Novacello continued his talk.

"If you could remove the roof of a printing plant and look inside, this is what you might see. The printing process begins in that far room, called the composing room. There, the *compositors* set a written text, or manuscript, in type.

"In the old days, they had to choose type by hand from a large case, one letter at a time. And since all the letters were backwards, it was easy to make mistakes—especially with letters that look alike. Compositors had to take a good look at each letter to be sure they had the right one. That's where the saying "Mind your p's and q's" comes from. Today setting type by hand in this traditional way is done only for very special printing jobs.

"These days, compositors use machines with keyboards on which they type the text. These machines set type much faster than is possible by hand. Until fairly recently, the most common typesetting machines were the Monotype and Linotype machines—both of which force hot molten metal into rows of type. "Hot metal" typesetting is on the way out, however, and is being replaced by machines that use paper and chemicals to set the type.

"After all the type is set, the columns of text must be arranged into pages. Usually the compositors print the text on paper which is then cut up and pasted onto mounting boards. The completed boards, looking just like the pages of the finished book, then go through a printing process. There are many different ways of printing, including such old standbys as linoleum and woodblock printing. For commercial purposes, however, a process called lithography is very important."

Mr. Novacello pointed to another room in the model. "You can see the lithographic process over here. *Lithographers* photograph the boards with large cameras and make negatives. They lay the negatives over metal plates that have been treated with a special light-sensitive chemical. When a plate is exposed to light, the chemical eats into the metal only in the places where the negative lets the light through, until . . . Presto! The plate has the image from the negative etched into it. And so a printing plate is created. Have I confused you all yet?"

Annie raised her hand. "How do the compositors make type for the pictures in a book?" she asked.

"Good question!" answered Mr. Novacello, smiling. "The answer is that they don't. When they paste up a board, they leave blank spaces where the pictures will appear. Meanwhile, other workers enlarge or reduce each picture to the desired size and insert it in its intended space. Then the lithographer makes a plate of the entire page, pictures as well as words.

"The next step is the actual printing. But first, let me give you a little math problem. If it takes 4 days to print a book using one printing press, and you want to print it in only 2 days, how would you do it?"

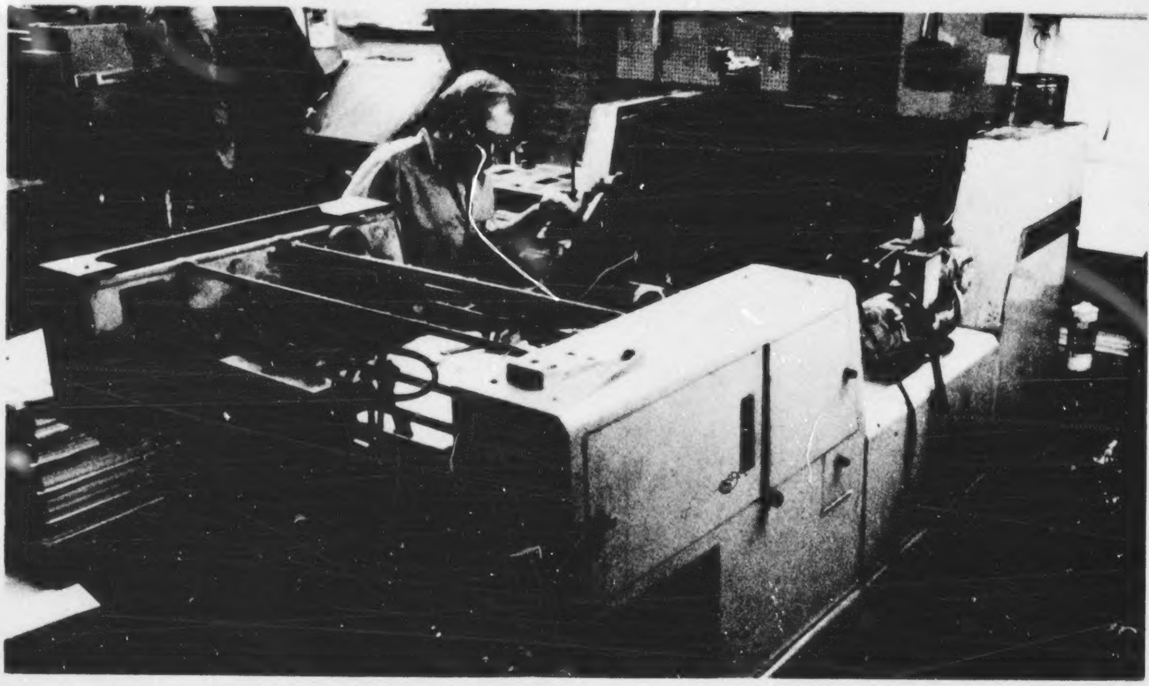
"Use two presses!" shouted several of the children.

"Excellent!" replied Mr. Novacello. "Now, here's the hard part. If each press requires its own set of printing plates, but all of your typesetting and lithography has produced only one set, what do you do?"

"Make another set!" shouted the same voices.

"You're all too smart!" said the guide. "And that's exactly why a print shop employs *electrotypers*. They make a wax or plastic mold of the printing plate. Then they form a metal shell in the mold, in the same way that the worker we saw earlier put a chrome layer on the car bumper—by electroplating. That metal shell, with a lead backing, becomes a duplicate plate.

"When all the plates are ready, they go the pressroom, this large area nearest us. There, the *press operators* set up the printing presses. They insert and adjust the plates,



Many printing press operators learn their trade through apprenticeship programs.

check the supplies of paper and ink, and run the presses. These presses print on both sides of paper that comes from a large roll, and then cut the paper into sheets of several book-pages each.

"These sheets go to the *bookbinders*, who fold them and assemble them into books. Using stitching and glue, they bind the books and attach the covers. After some final touches, the books are ready to be sold. And, if you have no questions, we are ready to move on."

Mr. Novacello led the group back through the main hall and into an adjoining room. The major exhibit was a large scale model, similar to that of the printing plant. Scattered around the edge of the room were life-sized figures standing at various machines. The children's curious gazes wandered every which way until the guide began to speak.

"I want to show you a few more metalworking occupations," he began, "but first I have a question. Who can tell me what a tool is?"

After a conspicuous silence, one brave boy raised his hand. "A tool is something you use to help you do something."

"Excellent," said Mr. Novacello. "And what are some examples of tools?"

Hammer, saw, screwdriver, pliers, chisel, all were mentioned in turn.

"Very good," commented the guide. "You have all given examples of handtools. What you see in this room are examples of *machine* tools. Some are about the size of a person; others, as you can see in the scale model, fill an entire room. Some perform only one kind of operation; others carry out a whole sequence of tasks automatically. But they all use power to cut, grind, drill, or shape metal.

"Machine tools are an important part of industry because they can produce metal parts quickly with a high degree of precision. They make it possible to build complex machines, like automobiles, in large numbers. And those machines have interchangeable parts. For example, if your family's car has a worn-out gear, you can buy a new gear that will be virtually identical to the original one. If the gears were made with handtools, this wouldn't be possible. But with machine tools, we can mass produce automobiles, electric motors, airplanes, and hundreds of other everyday products.

"The people who work with machine tools have different kinds of jobs. *Machine tool operators* have the least complicated jobs and need the least training. They run a machine and watch for problems after *set-up workers* have performed the more demanding job of adjusting the machine and preparing it for use. Set-up workers and operators usually stick to one kind of tool, such as a drill press or a grinder.

"*All-round machinists* have much more training and skill than machine-tool operators. They can operate many different kinds of machine tools, instead of just one kind. With their knowledge of materials and tools, they can do everything necessary to turn a block of metal into an intricate part."

Mr. Novacello walked over to one of the machines. "Take a close look at a machine tool," he said. "On each one you'll find a jig or fixture to hold the metal. You'll also see the "tool" portion of the machine that actually cuts, drills, grinds, or presses the metal. Very often, in order to make a particular part, a special jig or tool is needed. If so, a *tool-and-die maker* produces it. Tool-and-die makers are not only highly skilled machinists, but creative workers, too.

Tool-and-die makers need mechanical ability.

"And speaking of creativity, the most creative machine work of all is that of *instrument makers*. They are a bit like inventors—they take someone's idea and translate it into a piece of experimental or custom-built equipment. And instrument makers work without the benefit of a detailed set of blueprints. Often, there's only a rough sketch or idea to work from. They use their skill and imagination to fill in the details of the design and then carry it out."

After pausing to take a breath, Mr. Novacello called for questions. Annie, who was fascinated by the size of some of the machines, raised her hand. "How do they put these machines in the factories?" she inquired.

"I'm glad you asked that!" replied Mr. Novacello. "Installing industrial equipment is the job of *millwrights*. They may have to dismantle the old machinery, lay a foundation, move the new equipment in, and assemble it. All of this takes a great degree of skill. Any other questions?"

There were no further questions.

"Well then," announced the guide, glancing at his watch, "so much for machining occupations. I'm going to take you now to another part of the museum. There we will closely examine the nature of one last production occupation. Follow me, if you will, as we set off to explore the production of hot dog lunches by the cafeteria cooks!"

Millwrights use ropes and other rigging devices to help them move machinery.

Personal Characteristics

The day after the field trip, Mr. Borden had his social studies class review what they had learned at the museum. Walking up to the chalkboard and picking up a piece of chalk, he said, "Let's start by brainstorming for a few minutes. We learned a lot yesterday about the different kinds of jobs there are in industry. What can we say about these jobs? What are they like? What do they have in common? And what sort of person would be good at this work?"

There were a few moments of silence. Then Dave raised his hand and answered, "Making things is what their jobs are all about. So you could say that industrial production workers deal with *things*. They have a lot more to do with things than they do with people or ideas."

"They *work with things*," Mr. Borden wrote on the board. "Very good. Is there anything to add to that?"

Dave continued, "Well, yes. The things these workers deal with could be raw materials . . . machines . . . tools . . . equipment . . . the final product itself. But whatever it is, it's an object of some kind. Something you can touch or feel or handle."

"Fine,' said Mr. Borden. "Now, does everyone agree with what Dave has said?"

Phil spoke up. "I agree that all industrial production workers deal mainly with things, but beyond that, their jobs aren't the same at all! Just think about the different levels of skill they need. You have the set-up worker who gets a drill press ready to use, makes all those calculations and adjustments and so forth. . . . And then you have the drill press operator who just runs the machine! That operator's job seems pretty straightforward to me. It's just a matter of starting and stopping the machine and watching it while it's running.

"And don't forget the machinist," Phil continued, warming to his subject. "The machinists do highly skilled work. They have to know a lot to be able to set up and operate a lathe to make a part for a motor, for example. So even though industrial production workers' jobs have some similarities, they aren't all alike. They range from routine and simple to very complex."

"Industrial production work involves *varying degrees of skill*," wrote Mr. Borden. "Thanks, Phil. Now, what else?"

"These workers work mostly with their hands," suggested Barbara.

"That's right," said the teacher. "They do *manual work*. They have to be good at doing things with their hands in order to work with handtools or operate machines. It takes coor[illegible]nd dexterity . . . the same kind involved in [illegible] model or repairing a lawn mower, for example. [illegible]ything more?"

Annie had something to say. "These workers have to use their heads. They read blueprints, measure things, and make calculations."

"You're right," answered Mr. Borden. "Some of the industrial production workers we've learned about need what's called *spatial ability* to work from diagrams and

Working with handtools takes concentration.

blueprints. Spatial ability means they can look at a flat drawing of a three-dimensional object and picture the object in their mind. They also have to have good *form perception* to notice details and detect slight flaws in shapes and surfaces. And, like just about all workers, they have to be able to understand instructions, reason, and use common sense. As Phil has just told us, reasoning ability is much more important for some industrial production workers than for others. I think we were all impressed with the problem-solving skills it takes to be an instrument maker."

Pat spoke up. "Some of the jobs seem boring to me. Workers like assemblers do the same thing over and over again."

"Yes, that's right," agreed Mr. Borden. "Some industrial production jobs involve repetitive tasks. Jobs like that are just right, though, for people who like *repetitive, concrete, organized* activities. Now, what else can we say about these workers and their jobs?"

Emily raised her hand. "It seems to me that people who have what it takes to learn a skilled trade are people with some sort of mechanical interest. So many of the jobs we learned about at the museum involved machines and mechanical principles. The workers were applying mechanical principles to practical situations."

"*Mechanical interest* is important," Mr. Borden wrote. "And . . ?"

There was silence.

"Well, I can think of several things," continued the teacher. "Industrial workplaces can be noisy and dirty. Industrial workers have to be able to do their jobs in places that may be *uncomfortable* or *unpleasant*. Some of the jobs are strenuous, and require both *strength* and *stamina*. Not all industrial production workers have to lift and carry heavy things, of course, but some do. And workers like assemblers and machine-tool operators may be on their feet all day long. That's tiring, too."

Mr. Borden glanced around the room. "Does anyone have anything to add? No? Well, then, let's go on. The other day we saw a film about an automobile factory. . . ."

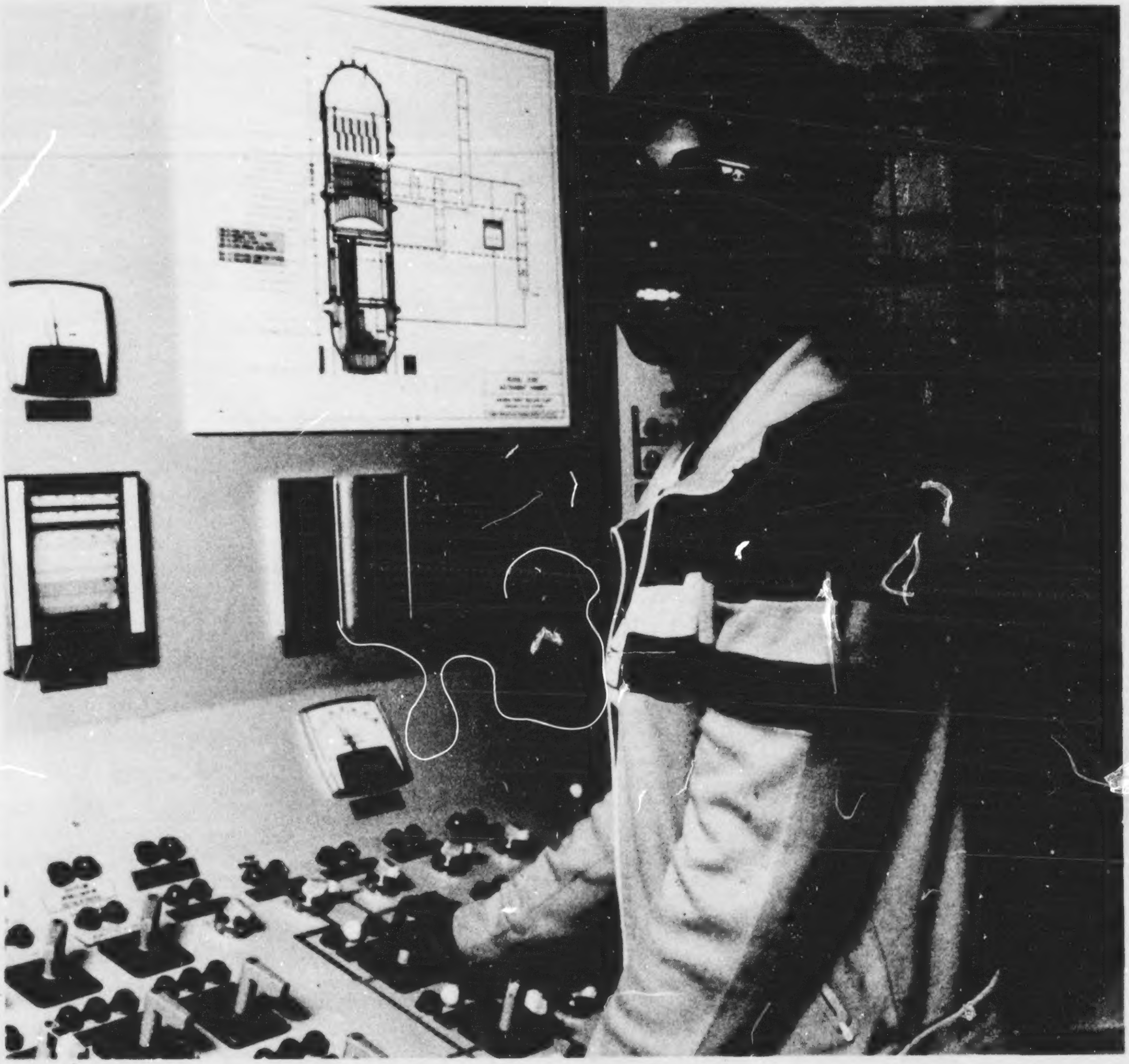
This automobile worker enjoys his job.

Training

A week after the museum trip, Annie gave an oral report in Mr. Borden's social studies class.

"If you wanted to be a lawyer," she began, "you would go to law school. To become a dentist, you'd attend a school of dentistry. But where would you go to learn an industrial trade? For less difficult occupations, such as machine tool operator or assembler, you could train right on the job. But how would you break into a skilled occupation? Would you enroll at the State College of Boilermaking? Tool-and-Die Graduate School? Welding University? That would be one way.

"Trade schools and technical institutes offer programs in the skilled trades—welding, printing, and tool-and-die making, for example. These programs provide theoretical instruction and the practical skills you'd need right away on the job. Vocational training is given in both public and private schools. You're probably familiar with the vocational education courses given here in



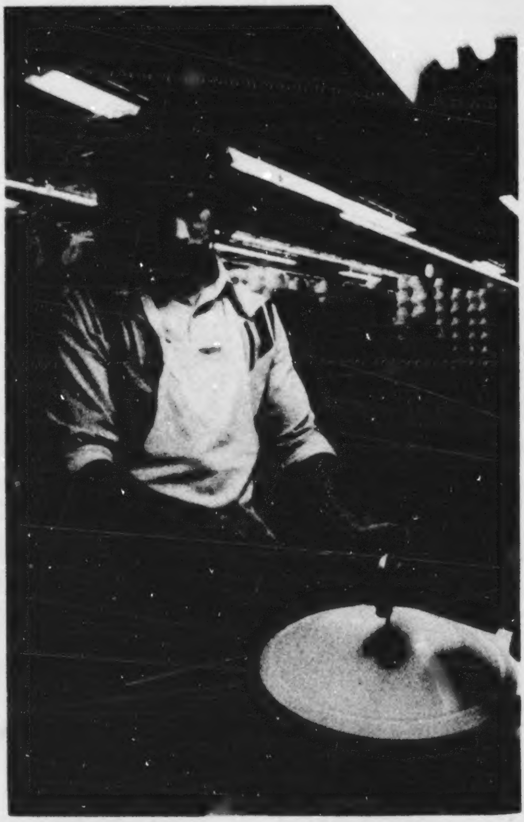
This woman is training for a job as an electric power plant operator.

our school system. There are, in addition, thousands of private schools that teach the skills you'd need for a job in industry.

"There are other ways to train for industrial production occupations, too. Often, the best route is through an apprenticeship. Consisting of planned classroom and on-the-job instruction, apprenticeships normally last about 4 years, although they range from 1 to 6 years. It all depends on the occupation. Apprenticeships are arranged by unions and employers.

"Here's how they work. Let's say you are an apprentice machinist with the Wonderful Widget Company. As an apprentice, you train for 4 years on the job, learning every aspect of a machinist's work. You also go to class to learn blueprint reading, shop mathematics, and other subjects. After completing all the requirements for the program, you receive a certificate that proves you have all the skills of a journeyworker machinist.

"Many workers do learn their skills without apprenticing. Quite a few get their training on the job by watching experienced workers, asking questions, and having someone guide them as they try the job themselves. While some of these workers have attended a vocational high school or a trade school, others begin with no previous exposure to the occupation. And then there are workers who "pick up the trade" on their own by watching, imitating, and experimenting whenever they can."



Many workers learn their skills on the job.

Employers generally prefer to hire people who have finished high school.

More About Training

The Job Facts at the end of this chapter summarize the training requirements for each of 33 industrial production occupations. If one interests you, you can begin preparing in high school. Math, science, drafting, shop, and other industrial arts courses will help. You can join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as welding, machining, and printing.

One final tip: Plan to finish high school. Employers do hire people who haven't finished high school, but they prefer those who have. They know that high school gives you basic skills you'll need for the job. And the diploma shows them that you're willing to finish something once you've started it.

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Assembler

Karen says, "You don't need a great deal of education and experience to do what I do, but you have to be good with your hands."

Exploring Careers

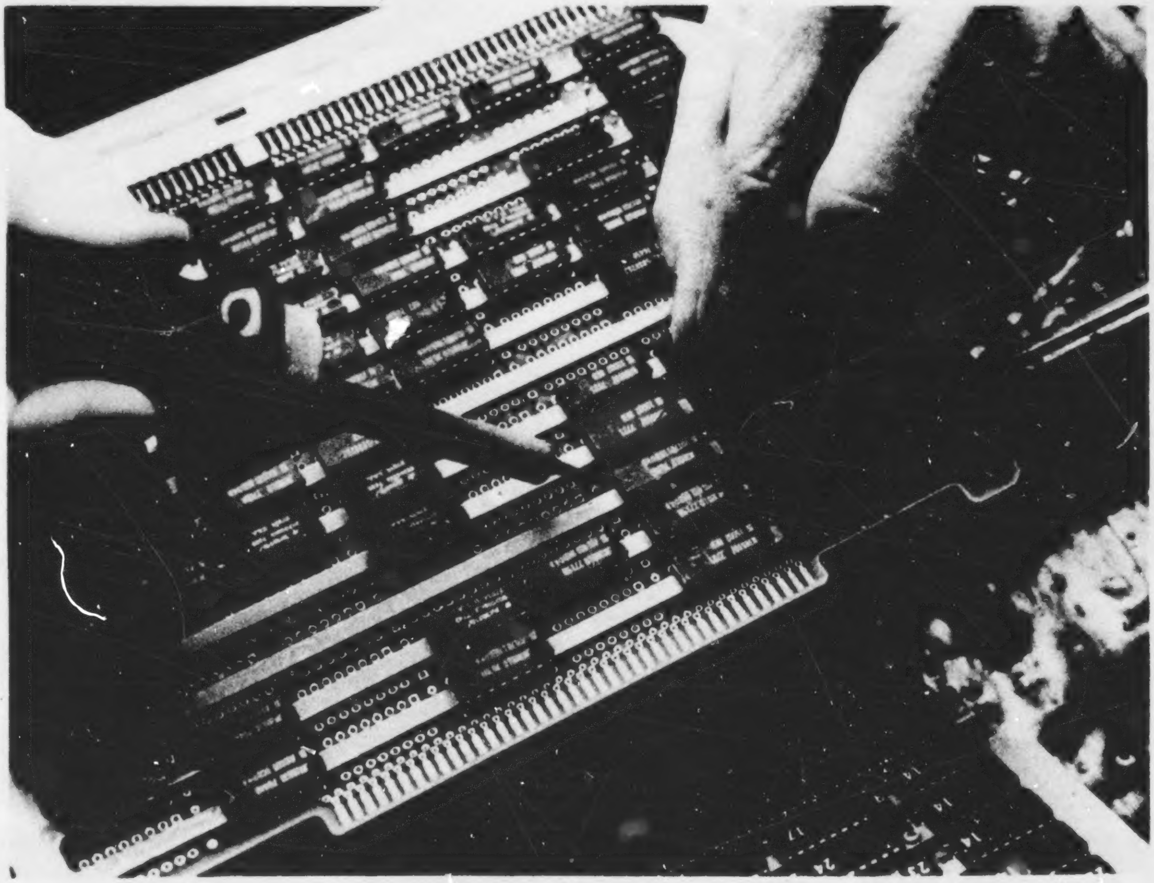
The traditional Fourth of July picnic in Elks Gap last weekend had been a big affair: everyone in town had been there. Under the trees the fire department had set up grills to barbeque the chickens that would be eaten long before the fireworks began. There, Karen ran into her new neighbor, Sarah Green. Sarah and her husband had moved to Elks Gap just a few weeks before, and she and Karen had quickly gotten to be friends.

Over barbequed chicken, Sarah had told Karen that she was thinking about looking for a job. Karen told her about Astro Electronics, the plant where she worked.

"Why don't you come out and apply for a job like mine?" she had suggested. "You don't need a great deal of education or experience to do what I do. But you do need to be good with your hands. You need patience, too, and have to be able to concentrate on very small tasks."

Karen is a bench assembler. She assembles circuit boards for television sets and other electronic equipment, and works at a bench rather than on a moving assembly line. Putting together complete circuit boards means installing all the components: Capacitors, resistors, diodes, transistors, and meds. It means soldering these components into place, and installing connecting wires where necessary. Karen usually works from a diagram or blueprint that shows her where to insert each component. Sometimes, however, Karen uses a "sample board"—an exact model of the board she is constructing.

Karen's job as a bench assembler is more complex and involved than that of an assembly line worker. Karen assembles the circuit boards from start to finish, instead of just inserting one or two components, which is what she might be doing if she were working on an assembly line. On an assembly line she would repeat the same task



Assembling electronic components is very delicate, detailed work that requires concentration.

over and over again, rather than complete all the steps of the circuit board assembly process herself.

Karen didn't need any special training to get her job at Astro Electronics. The company put her through a training course the first day she went to work there, and since then she's been learning and gaining speed through practice.

"It's a bit like putting together a puzzle or a model airplane," she had told Sarah. "It's very delicate, detailed work that requires a lot of concentration. I have to use a magnifying glass sometimes, when I'm working on very tiny boards. It can be hard on the eyes. But I enjoy the work. It's not boring at all, because I put together many different kinds of circuit boards, and the variety makes it interesting."

Karen uses a magnifying glass to put together very small parts.

Karen had been excited and enthusiastic when she talked to Sarah about her job. But now the holiday is over and Karen is back at work. She has to make an effort to concentrate on the work in front of her.

Tools are scattered around Karen's workbench—wire strippers, wire cutters, pliers, lacing cord, a soldering iron. There's cleaning fluid on the workbench, and several trays of electrical components, too. Karen picks up an electrical component and plugs it into some holes in the circuit board. She turns the board over and uses her wire cutters to clip the wire that is sticking out of the circuit board in the back. Then she picks up her soldering iron and solders some metal onto the bottom of the component that's sticking through the circuit board. The melted metal, as it dries, holds the component securely in place. Karen picks up another electrical component and repeats the process.

The "bench" that Karen is sitting at is actually a row of long tables, like the kind used in a school cafeteria. There are lots of benches—row after row. The benches fill up the large warehouse-like building where Karen works. The work area is clean and the temperature is comfortable. Karen likes being able to sit down all day rather than stand, as she'd probably have to do on an assembly line. Sometimes her neck and back get sore from bending over her bench, but it's better than standing all day, in her opinion.

All of the people working at Karen's bench are assembling the same kind of circuit board that Karen is. They work quietly, each concentrating on the work at hand. It's easy to become involved in the work when there's so much detail.

"How's everything down on this end?" The question startles Karen, but she recognizes the voice. It's her supervisor, Betty.

Karen smiles and replies, "All right, I guess, but I'm going to need some more resistors soon."

Betty nods. "I'll go bring some over. Does anyone else need anything?" The man next to Karen asks for some more wire. Betty nods again and then hurries off.

"She's always rushing around," Karen thinks to herself. "But then I guess supervising 30 workers is a pretty demanding job."

Before long Betty is back with the materials. "Oh, Karen," she says, "we have a new worker. She'll be coming out of training after lunch. I thought I'd place her next to you, so that you can help her if she has any problems."

"All right," Karen replies quietly.

"By the way," says Betty, "it's your friend Sarah." Karen looks up with a surprised smile.

Exploring Careers

Exploring

Assemblers need to be good at working with their hands.
- Are you good at fixing things?
- Are you handy with tools?
- Can you repair your bicycle?
- Do you enjoy leisure activities that involve working with your hands, such as sewing, macrame, stringing beads, model building, or furniture refinishing?

Assembly work usually involves a lot of repetition. Assemblers must be willing to perform repetitious tasks.

- Do you enjoy needlework such as knitting, crocheting, or quilting?
- Can you put up with the repetition involved in mowing grass, shoveling snow, painting a house, or putting down tile?

Speed can be important in assembly work.

- Are you good at activities that require finger dexterity such as slapjack, jacks, or shuffling and dealing cards?

Assembly work requires attention to detail and the ability to follow diagrams and written directions.

- Are you good at following a recipe, sewing or doing needlepoint from a pattern, building a model from written instructions, assembling a radio from a kit, or painting by numbers?
- Are you good at reading maps?
- Do you understand football plays when they're written out?

Assemblers work indoors. They stay in a small work area while they do their jobs.

- Can you sit still through your classes?
- Can you concentrate without feeling the need to move around all the time?

Suggested Activities

Ask your teacher to arrange a plant tour if there is a factory in your community. Prepare questions in advance on the types of production jobs there. Ask about the education and training needed to get a job, starting pay, and opportunities for advancement.

Factory workers relaxing in the products they make.

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Industrial Production Occupations

This worker is filling capsules with medicine.

These strands are being twisted to make tire cord.

Prepare a report on Henry Ford and the assembly line for your English or social studies class. Explain how this method of organizing work has affected the manufacturing process. How has it affected the workers?

Use *Working* by Studs Terkel as the subject for a book report in your English class. (New York: Pantheon Books, 1974.)

Related Occupations

Assemblers aren't the only workers with factory jobs. Using the descriptions below, unscramble the letters to find the names of other production workers.

1. GIEWSN NAEMCIH TOAPRORE. I use a sewing machine to join, gather, hem, reinforce, or decorate such articles as carpets, gloves, hats, bags, and upholstery.

2. YAPSR NEITRAP. I use a spray gun to spray the surfaces of machines, manufactured products, or working areas with paint, enamel, glaze, gelcoat, or lacquer. Before painting something, I often clean grease and dirt from it; sometimes I fill cavities and dents with putty.

3. HAMNICE TURTEC. I cut fabric into parts for such articles as canvas goods, house furnishings, garments, hats, stuffed toys, and upholstered furniture, using a portable electric cutter. I generally cut many layers of fabric at a time.

4. CITAAMOUT NIRTP EPELOVERD. I tend several machines that automatically develop, fix, wash, and dry photographic prints.

5. CIAMNEH GAPARECK. I tend machines that perform packaging functions, such as filling, marking, labelling, tying, packing, or wrapping containers.

6. NARY DWENRI. I tend machines that wind strands of yarn into packages for further processing, shipment, or storage.

7. PLUMAOE RELFLI. I tend a machine that fills small glass containers known as ampoules with measured doses of liquid drug products.

8. ENARCYN KEWROR. I put fruits, vegetables, meat, cheese, and other food products into processing equipment—washing, peeling, refrigerating, coring, pitting, trimming, grinding, dicing, cooking, or slicing machines. The work I do is used in canning, freezing, preserving, or packaging food products.

9. GTNTKINI HICANEM TROPAEOR. I tend several machines that knit fabrics, garment parts, or other articles from yarn.

See answers at end of chapter.

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Machinist

Machinists do very precise work.

Industrial Production Occupations

Joe rolled over and opened his eyes. Through the dense grey haze he could make out small lights twinkling like stars.

"Strange, it wasn't foggy out," he thought, trying to make some sense of the haze that had swallowed him up. Images swirled through his mind: A quiet summer night, the street leading to his house, unfamiliar lights behind a hedge, a blinding flash, and. . . .

Joe realized with a start that he was no longer outside his house. In fact he had no idea where he was. Alarmed, he jumped to his feet, but lost his footing and fell backwards. As Joe struggled to his feet, he saw that the surface underneath him was as clear as glass. He knew already that it was as slick as ice.

Joe made an effort to focus on his surroundings despite the grey haze that made it difficult to see. He seemed to be in the middle of a large round room. He stood and cautiously took a step toward the lights.

"Who are you?" boomed a loud, authoritative voice. Joe froze.

"Who are you?" repeated the voice impatiently. Joe saw the spheres of light blink as the voice spoke. He felt compelled to answer.

"I'm Joe Von Braun. Where am I?"

No answer. Joe thought about making a break for it, but remembered how slippery the floor was.

"I must be dreaming," he thought. "Of course, this is only a dream. I'll wake up any minute."

"Please, don't run," said another voice, a soft and soothing one this time. The sound frightened him even more, because this voice was closer and undeniably real.

As Joe turned in the direction of the voice, the haze grew lighter. Only a few yards in front of him a sphere of light was suspended in midair. In the haze it looked like the sun on a cloudy day.

"Please, sir, don't run," repeated the gentle voice. The light blinked as the words were spoken. Joe still was too frightened to speak.

"We know our first voice disturbed you, but we mean no harm. We are visitors to your world and we wish to know more about you. We have talked to many of you, but there is still so much to learn. Please tell us about yourself."

The voice was calm and reassuring. Encouraged, Joe began to speak. He spoke haltingly at first, then more confidently.

"I don't know where to begin. . . ."

"Tell us anything."

"Well, my name is Von Braun. I'm 35. Have a wife. What else? I'm a machinist. . . ."

"That's interesting. We've never talked to a machinist before. What is it?"

"A machinist is. . .that is. . .I make things."

"What things?" asked the voice, quietly.

"Parts for machines, usually. I work in a machine shop that makes replacement parts for water pumps, electric generators, sometimes cars. . .well, anything, really. We'll make almost anything from metal."

"What is metal?"

"What is metal?" repeated Joe, puzzled. "Everyone knows what metal is."

"We're sorry, but we don't," replied the voice. "Please explain metal to us."

"Metal is a. . .well, it's steel, iron, brass. . .I don't know the scientific definition. How can I explain? Wait, I'll show you."

Joe searched his pockets and found the 6-inch steel ruler he used at work. He held the ruler in front of him and said, "This is metal. This is steel. . . ."

A white light streaked from above, touched Joe's hand and instantly disappeared. The ruler was gone. Joe fell to his knees. He was almost in tears.

"We do know metal. We have seen it before. Tell us more about how you work with metal."

"Please don't hurt me," cried Joe.

"Don't be afraid," responded the voice, as the sphere of light blinked rapidly. "We would never hurt you. We only want to understand. We have seen metal before, but we have nothing like it where we live. We are eager to learn about it. How do you make things from metal?"

Joe hesitated, then began talking again. He did not know what else to do.

"Usually I work from a blueprint the boss gives me. I start. . . ."

"What is a blueprint?" interrupted the voice.

"A blueprint is a drawing of the part I have to make. By looking at it I know what the final product will look like. The blueprint also has the specifications. They tell me how long and wide to make the part and what kind of metal to use. Usually the specifications also give an estimate of how much time I have to make the part."

"Thank you, we understand what a blueprint is. Please continue," said the voice, as the sphere blinked.

"First I gather the metal stock. I'd better explain that. "Metal stock" is a term for all the different pieces of metal I'll be working with: Steel rods, brass tubing, bars of aluminum, whatever. Then I do the layout. I mark the metal to show where I should cut it, put holes in it, or shape it."

"How do you cut it or shape it? Isn't metal too hard?"

"I use machines," explained Joe. "There are all kinds of machines specially designed to work metal—lathes, milling machines, drill presses, planers, and grinders, for example

"I use saws to cut metal to the right length; drills to put holes in it; planers to shape it; and grinders to smooth its surface. The milling machine and the lathe are the most versatile of all. They can do almost any job."

"So these machines do all your work," said the voice.

"No, no, no," Joe said hastily. "The machines are useless without me. I have to set them up, so they run properly."

"Oh, excuse us. Please go on."

"After I've done the layout, I start using the machines. The first thing I do is decide which machines to use. Usually that depends on what I'm doing. For some jobs I have to use a certain size lathe or a milling machine. For others I can choose how I do the job. Take drilling a hole. I can use a drill press or a milling machine. The drill is a little faster, but the milling machine is more accurate.

"The next step is to set up the machine. The part of the machine that actually cuts the metal I'm working on is called the tool. Tools come in all shapes and sizes. Some are round with teeth like a circular saw. Others look like chisels. Tools are made from different types of metal, usually very hard steel. Before I can cut the metal workpiece, I have to select the tool that's the right shape, size, and hardness to make the cut I need.

"Then I mount the tool on the machine and set the speed that determines how fast the tool will cut the metal. The speed is very important. If I make the cut too fast, the tool will wear out quickly or break. This could ruin the workpiece. Sometimes I set up a hose that sprays liquid on the tool and the metal. The liquid keeps them cool as the cutting is done.

"All of this may be hard to understand. Let me give you some examples. Say I had a bar of metal an inch in diameter and I wanted to make it thinner—just half an inch in diameter. I would put the bar on a lathe. The bar lies in the machine horizontally and spins very fast. A tool that looks like a chisel would be held in a clamp on the side of the machine. By moving handles and gears at the base of the lathe I can position the tool against the spinning bar, to cut it to the right size.

"If I wanted to put a hole in the same bar, I would use the milling machine. The bar would be clamped on a flat table that moves up and down and sideways. The tool—in this case a drill—is held in an arm above the table. The tool spins and the bar is positioned under it.

Machinists are among the most highly skilled manual workers.

I make the hole in the bar by moving the table up until the tool cuts through the metal.

"I hope that's clear. I wish I could explain it better."

"You're doing fine," said the voice. The lights blinked several times. "What do you do after you have cut the metal with the machines?"

"Well, after I've cut the metal, I measure it to make sure it meets the specifications. Sometimes I can do it with a ruler, that thing I showed you before. Most jobs require more precision. A workpiece may have to be between 5.999 and 6.001 inches long. I use a micrometer to make really precise measurements. The precision is necessary because the part I make usually goes into a larger machine. I have to make it just the right size, so it fits.

"When I'm sure all the pieces are acceptable, I can assemble the part. That means a lot of hand work with files, hammers, and screwdrivers—and more measuring. And that's it," concluded Joe.

"Do all machinists do the same things you do?" asked the voice.

"No, not at all. It depends on where you work. Some machinists make the same part over and over again. Others make many different kinds of parts; that's what I do. And some machinists work in factories repairing production machinery. Well, is there anything else you want to know?" sighed Joe.

"Are you tired? You have been very helpful."

Machining requires concentration.

"No, I feel fine. I like talking about my job. Not everyone could do what I do. You have to like machines and tools. It's dirty, hard work a lot of the time. You're on your feet most of the day, and it's not just physical work. You have to be able to plan. You have to be good at math to calculate the measurements, machine speeds, and such. You have to be able to concentrate and have the patience to do really precise work. Besides all that you need a bit of imagination. Not everyone can make a three-dimensional object from a flat drawing."

"You are very proud of your skills."

"I always have been—ever since my apprenticeship. There's something special about taking a piece of metal and turning it into something useful."

"What is an apprenticeship?"

"It's a traditional way of learning a craft or trade. You learn by working with experienced workers. And by studying. After I graduated from high school I was accepted in an apprenticeship program at the Navy Yard. I learned to run the machines on the job and studied math, blueprint reading, and the characteristics of metals in evening classes."

"You have been most helpful," said the voice. "But if we don't return you now, you will be missed."

"Wait a minute," shouted Joe. "Who are you? Don't you think you owe me some explanations?"

"Whatever we tell you, you would forget in a short time. Goodbye and thank you." The sphere vanished.

"Wait! Wait!"

As Joe shouted the grey haze grew more dense. Soon he could not see anything. He felt very warm and the haze was so thick he had trouble breathing. He thrashed wildly with his arms.

A hand firmly gripped his shoulder. "Joe, wake up! Wake up!"

Joe jumped up. He was in his bed and his wife was shaking him.

"That must have been some dream," she said.

"Was it ever!"

"It's over now. Go to sleep."

The next day Joe could not recall any of the details of his dream nor could he find his steel ruler.

Exploring

Machinists make parts for factory machinery, cars, and other metal products.

- Do you like to build things?
- Do you like to work with your hands?
- Do you build models or make jewelry?
- Do you repair bicycles or customize automobiles?
- Do you enjoy woodworking?

Machinists use handtools and such machines as lathes and drill presses.

- Do you use tools or machines for a hobby, for work around the house, for gardening, for farming, or for repairing cars, vans, or trucks?
- Do you like to learn how machines work?
- Do you like to learn how to use tools?
- Is it easy for you to learn how to use a tool you've never used before?

Machinists follow blueprints and diagrams. They use mathematics to make measurements and set up their machines.

- Can you read and understand graphs, diagrams, and charts?
- Can you read road maps?
- Can you look at a drawing and picture the three-dimensional object in your mind?
- Do you like to work with numbers?
- Do you like to solve written math problems?

Machinists must do accurate work.

- If you are fixing or building something, do you try to do it just right?
- Have you ever done any detailed work?
- Do you build complicated models or embroider?
- Can you work on something for a long time without becoming bored or careless?

Machinists usually work with little direct supervision. They must be responsible.

- Do you usually get your school assignments done on time?
- Can you work alone successfully?
- Do you have hobbies in which you work alone?

Suggested Activities

Spend time on hobbies and other activities in which you build or repair things. Build models. Do carpentry. Sculpt. Make metal jewelry. Make repairs around your home. Repair your bicycle.

Volunteer to repair toys for a nursery school or day care center, or for a community organization such as the Salvation Army.

Join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as machine shop and machine drafting.

Join an Auto Mechanic or Skilled Trades Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If your school has a machine shop, ask the instructor to talk to your class. Arrange a tour of the shop.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Handywoman and Metal Arts.

If you are a Boy Scout, try for merit badges in Machinery, Metallurgy, Metalwork, and Model Design and Building.

Investigate the properties of metal for a report for your science class or for a science fair project. Compare the characteristics of several metals. Gold, for example, is relatively soft and easy to shape. Steel is harder and more difficult to work with. The encyclopedia is a good place to start your research. Public and school libraries have books that explain how different metals are made and used.

As a topic for a science or industrial arts class, report on machine tools such as lathes, milling machines, and drill presses. Illustrate your report with pictures and diagrams. The encyclopedia is a good place to get an overview of the topic. Library books will explain in more detail how machine tools work and what they are used for. Write for information to the National Machine Tool Builders Association, 7901 Westpark Drive, McLean, Virginia 22102.

Mathematics is an essential tool for machinists because precision is so important in their work. Machinists may work within tolerances as fine as 1/1,000 of an inch. To achieve this sort of precision, they make measurements and do calculations. See if you can solve the problems below. They are typical of some of the simpler problems machinists deal with every day.

- A machinist must cut the following lengths from 2-meter bars of steel: 156 centimeters, 176 centimeters, 19 centimeters, 42 centimeters, and 117 centimeters. How many 2-meter bars will that take? How much steel will be left over?
- In cutting gears for a piece of machinery, the number of teeth on a gear depends on the diameter of the wheel. A machinist has just made a gear with 50 teeth and a diameter of 10 inches. How many teeth would be on a gear with a diameter of 7 inches?
- A machinist has been assigned to cut a groove in a metal block so that the depth beneath the groove is 2.5983 inches. The block is 2.7482 inches thick. After finishing the job, the machinist measures the groove and finds it is .1498 inches deep. In order to work, the part must have been machined to within a tolerance of 1/10,000 of an inch. Is the part acceptable?

See answers at end of chapter.

Because measurements are very important in machinists' work, the conversion to the metric system will affect their job in a number of ways. Use the topic of metric measurement in metalworking for a report in a mathematics class. You might begin your research by writing for information to the Office of Weights and Measures, National Bureau of Standards, Washington, D.C. 20234. They also will supply a list, by State, of speakers to talk about the metric system.

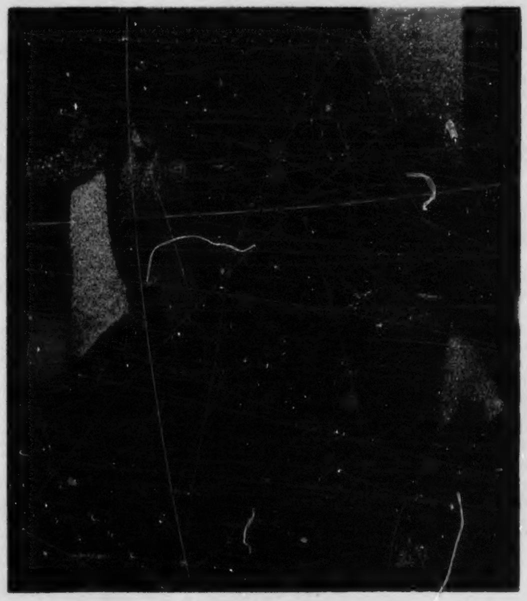
Related Occupations

Machinists are not the only workers who deal with metal and machines. Eight occupations in which the work is similar to a machinist's are listed below. Try to match the workers with their job titles.

a. Machine tool operator
b. Instrument maker
c. Setup worker
d. Tool-and-die maker
e. Mechanical engineer
f. Industrial machinery repairer
g. Jeweler
h. Watch repairer

1. Dan makes machines that are used for measurement in industrial production and research. He has all the skills of a machinist and more.

2. Brenda sets the speed on drill presses used by less skilled workers.



Most machine tool operators learn their skills on the job.

3. George works with precious metals. He can shape gold, silver, or platinum just as a machinist shapes steel or brass.

4. Jim makes or repairs parts for a machine used by almost everyone. He uses a lathe just as a machinist does. The parts in his machine are so small that Jim uses a magnifying glass and tweezers to work with them.

5. Sarah designs machinery. She had to attend college to get her job.

6. Beverly makes the cutting devices used in machine tools. She learned many of her skills as a machinist.

7. Doug operates a drill press and grinding machine. He learned his skills on the job in a few months.

8. Susan repairs and maintains machines used in factories. Sometimes she uses machine tools to make replacement parts. Usually, however, she has the factory's machinist do the work.

See answers at end of chapter.

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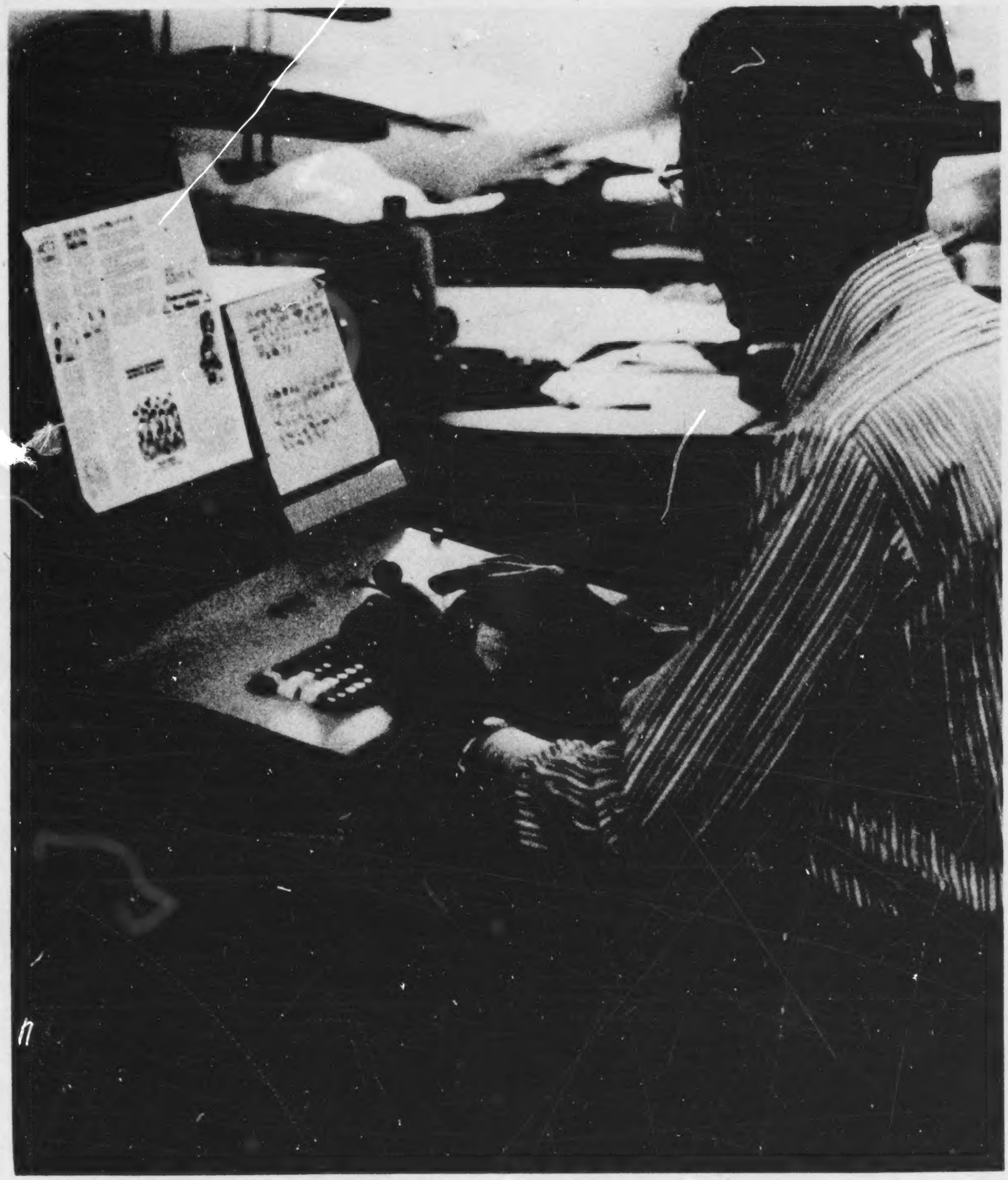
Photocompositor



Bernard Petrocelli is setting type on a phototypesetter. "This is like using a typewriter," he explains, "but there is a lot more to know."

Industrial Production Occupations

Bernard Petrocelli pulled into the parking lot of Broadview Elementary School. Before getting out of his car, he glanced in the rear-view mirror to make sure that his tie was on straight. "I'm glad I don't have to put on a suit and tie every morning," he thought to himself.

He checked in at the office, where Ms. Kawasaki, his daughter's sixth grade teacher, was waiting to greet him.

"It certainly is nice to meet you, Mr. Petrocelli. We've all been learning so much from the parents who come and speak to the class about the work they do. I'm sure the children will be fascinated to hear about your job."

"Thank you very much," replied Mr. Petrocelli as the two walked down the hall.

Ms. Kawasaki continued, "I've been doing a bit of research and I'm amazed at the changes that have taken place in the printing industry in the last 20 years. In fact, I just finished reading about a process for storing information called micropublishing. It seems that they are working on some equipment that can record an entire textbook on an area the size of a postage stamp!"

"Yes, there have been some astounding changes in printing technology. And, with the use of computers, things are changing more rapidly than ever. My work in the composing room has come a long way from the days behind a noisy Linotype machine casting hot metal."

The two adults entered Ms. Kawasaki's classroom and took seats in the back of the room, waiting quietly for the music teacher to finish his lesson.

After music was over, Ms. Kawasaki went to the front of the room to speak to the class. "As you all know, we have a guest speaker today who is here to help us learn more about the world of work. He is Maria's father, Mr. Petrocelli, and he is going to tell us about his job as a photocompositor in a print shop. We already have discussed how important printing is, as a means of both communication and learning, so I think you will all be interested in finding out more about the process. Now, without further delay, I'd like to introduce Mr. Petrocelli."

"Good morning, boys and girls," Mr. Petrocelli began. "It's a pleasure to be here. As your teacher told you, I'm a photocompositor and I work for the Atlas Printing Company—a large shop downtown. We print everything that's fit to be published, including magazines, brochures, advertisements, envelopes, and even labels for cans of food. This morning I'm going to talk to you briefly about the history of printing and then I'll tell you about my job and what I do. Please feel free to ask questions at any time."

A boy who was sitting on the edge of his seat raised his hand and burst out, "Do you print money, too?"

Mr. Petrocelli smiled and replied, "Paper money is printed, but that's one job we don't handle at Atlas. It's illegal for anyone but the Federal Government to print its paper currency. That's done at the U.S. Bureau of Engraving and Printing in Washington, D.C.

"Printing was first practiced by the Chinese over a thousand years ago," Maria's father continued. "They used carved wooden blocks to print. I imagine you've done pretty much the same thing yourselves in art class. Those early Chinese printers carved pictures or words on wooden blocks, inked or painted the blocks, then pressed them against another surface to make a print.

"The wood block method of printing developed by the Chinese was slow and painstaking. Most books and manuscripts were handwritten until the 1400's. About this time, people began experimenting, looking for a way to produce books more quickly and cheaply. Around 1450, a German named Johann Gutenberg invented a process for making movable type out of metal. The process allowed him to use the same type over and over again to print different pages. He also invented the printing press, which he probably adapted from a wine or cheese press, and developed sticky ink to be used with the metal type."

A girl in the front row raised her hand. "We learned that Johann Gutenberg is called the Father of Printing."

Mr. Petrocelli replied, "Yes, he is often referred to as the Father of Printing because his invention of movable type revolutionized the printing process. Printing spread rapidly in Western Europe, and by the early 1500's more than a thousand print shops were operating."

"What has happened since then?" asked a small boy in the back of the room.

"Our story continues," said Mr. Petrocelli. "The first book was printed in America less than 20 years after the Pilgrims landed at Plymouth Rock. The writings of two early printers, Benjamin Franklin and Thomas Paine, strengthened the spirit of unrest in the 1700's that eventually brought about the American Revolution. Their influence kept up the will of the Colonies to win the war.

"Over the years, printers gradually introduced improvements in the typesetting and design of books. Eventually, the job of printing became specialized. That means the printer—who in the days of Benjamin Franklin was also the publisher, editor, type designer, and book seller—no longer performed all those other duties."

"Are you a printer?" a girl in the third row wanted to know.

"Well, not exactly...I was just getting to the part where I fit in," answered Mr. Petrocelli. "The 20th century has witnessed many changes in printing. Jobs have become much more specialized as the industry has grown. And the printing industry has grown tremendously! Well over a billion books are bought each year in the United States alone. Furthermore, technology has changed the way we do our jobs. Today's world is one of automation. Machines perform much of the work that used to be done by hand. I think my job in the composing room illustrates some important changes that have taken place in the printing industry over the last 25 years.

"In the composing room, we set the type. We take the "copy"—the material that is to be printed—and from that we prepare pages of type. When I first started as a compositor 27 years ago, I operated a machine called a Linotype. I learned the work right on the job, as an apprentice. To make a line of type, I punched the letters from the keyboard. The machine then made words from a hot metal mixture it had pressed into molds of these letters. This cooled into a solid metal strip—or 'line o'type'." He reached into his pocket and pulled out a silver colored bar. "To give you a better idea, I brought along a line of type."

"Can we pass it around the room? I can't see it," came a voice from the back of the room. "We'll handle it very carefully."

Mr. Petrocelli smiled. "That's a good idea, because the metal is a mixture of lead, tin, and antimony, and it will bend or scratch rather easily. It's not hard like steel or copper."

He continued, "Operating the Linotype was hard work. The machines were hot and noisy and my clothes often got splashed with hot lead."

"Then why did you stay in that job?" a girl asked.

"There were lots of good things about the job," Mr. Petrocelli replied, "For one thing, I've always been proud to work in the printing industry because it's so important to all of us. And a job like mine takes skill. When I was operating the Linotype, I had to space all the words

Computers and electronics are changing printing methods. Hobbies and courses in these areas provide a good background for printing.

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properly to fit the column size and decide where to break words at the end of a line when necessary—all those things require judgment.

"After I had been there about 10 years, the company I was working for adopted a new method of setting type. Instead of the machine casting of molten metal, type is set by a photographic process that uses paper and chemicals. Because photography is such an important part of this process, it's called phototypesetting. Sometimes it's called photocomposition.

"To make the change, I had to go through a training program. I wasn't at all pleased about changing over to cold type at first, and complained about it to the union representative. I figured that I had mastered the Linotype and I didn't want to start from the beginning with a new machine. I was pretty upset for a while. But eventually I realized that the Linotype machine really was on the way out, and that I had no choice but to pick up new skills."

"Wasn't it hard to "relearn" your job after all those years?" asked a boy sitting near the windows.

"Becoming a photocompositor did take some getting used to," Mr. Petrocelli replied. "I had to learn to work a whole new machine. The keyboard was completely different, so I had to block the old one from my mind. Also, this machine produced paper prints or film negatives instead of strips of metal."

"Why did the company change from hot metal to phototype?" a girl asked.

"Phototypesetting offers many advantages over casting type from hot metal," answered Maria's father. "It's a fast, flexible, relatively inexpensive method of setting type.

"For example, in phototypesetting, the print will always be clear and perfect, no matter how many copies must be produced. That's because it's photographed. When metal type is used—the kind you're passing around the class right now—the metal letters must be inked to make print. However, the pressure of the metal type against the paper causes "ink squeeze", which tends to make the edges of the printed letters irregular. Also, phototype is very convenient when different type sizes are needed for one job. A simple magnifying lens allows the machine to photograph correctly sized type."

Mr. Petrocelli went on. "My career took one more major twist when I went to work for Atlas about 4 years ago. Being a large company, they had the most modern equipment. Once again I needed more training. . .because Atlas uses computers in their typesetting system."

An enthusiastic student burst out, "Wow, another "new career" for you!"

"In a way, yes," Mr. Petrocelli responded. "In this typesetting operation, I type on a special keyboard just like I did in the other phototype process. The keyboard has many extra keys, however, and I had to learn them all. There are keys, for example, that indicate the size and style of type and the space between letters. There also are keys that give the machine directions such as "delete" or "store in memory". A screen that looks like a television screen has been added to the keyboard so now I can see the characters as I set the manuscript. The screen is called a Visual Display Terminal.

"After the copy has been typed onto the keyboard, my machine produces a tape that later is fed into a computer. The computer's job, basically, is to decide when to hyphenate words and how to space them properly so that the margins will be even. The computer has been programmed with a set of rules so that it knows, for example, that *hearing* should be hyphenated *hear-ing*. It also is instructed that *ring* should not be hyphenated *r-ing*, as that's a one-syllable word. When I handled the Linotype, I made all those decisions myself. The computer produces a tape that "drives" our phototypesetting machine and prints out material much faster than any person could do it. Our system, for example, can print a page of type every 3 or 4 seconds!"

The students clearly were impressed. Maria beamed. Her father then asked for more questions.

One boy hesitated, then asked, "In the beginning, you said you learned your trade by apprenticeship. I'm not sure what that means."

"That's a good question," Mr. Petrocelli replied. "In the apprenticeship training program, I learned my trade on the job—at first by watching others and then picking up skills on my own. At the same time I had classroom instruction in related subjects, such as typography, printing, and English. The program was run jointly by the union I belong to and the company. It lasted 4 years; I gradually gained more responsibility and earned more money."

Another pupil asked Mr. Petrocelli what advice he'd give to students interested in printing.

"First of all, I would recommend that you finish high school. There are courses you can take in school that will give you a good background—typing and English, for example. Don't underestimate English! Grammar is a "must". And learn all you can about electronics, computers, and photography—for that is where the future lies in the printing industry."

Ms. Kawasaki walked up the aisle and joined the speaker at the front of the room. "I'm afraid our time is up, but I'd like you to know how much we enjoyed your talk today."

"It was my pleasure to be here," replied Mr. Petrocelli.

Just then the class broke out in loud and enthusiastic applause.

Exploring Careers

Exploring

Photocompositors need finger and manual dexterity in order to type copy on the keyboard of a composing machine.

- Do you knit, do needlework, or do macrame?
- Can you thread a needle quickly?
- Can you type?
- Are you good at games like slapjack and jacks?
- Can you shuffle and deal a hand of cards quickly?
- Do you enjoy leisure activities that involve working with your hands, such as making jewelry, building models, or refinishing furniture?

Photocompositors must have an eye for detail. They must follow the copy exactly and detect every single mark on material that comes back for correction.

- Can you read road maps easily? Can you find a place on a road map quickly?
- Do you like to do word-finds and other games where you must find hidden objects in pictures?
- Are you good at following a recipe, sewing or doing needlework from a pattern, building a model from written instructions, assembling a radio from a kit, or painting by numbers?

The work of photocompositors can be repetitious.

- Do you enjoy needlework that involves a lot of repetition, such as knitting, crocheting, or quilting?
- Can you put up with the repetition involved in mowing grass, shoveling snow, painting a house, or putting down tile?

Photocompositors work indoors. They are confined to their work areas for long periods of time.

- Can you sit still in the car during long trips?
- Can you sit still through your classes or an assembly program?

Suggested Activities

Ask your teacher to arrange a field trip to view the printing process at a local printing plant or newspaper.

Invite a compositor to speak to your class about his or her job. Ask the speaker to bring in galley proofs and explain the proofreader's marks.

Try your hand at printing, using one of the inexpensive printing kits you can obtain at hobby shops or department stores.

- Put your name or initials on greeting cards or stationery.
- Make business cards for the staff of your school newspaper or yearbook.
- Print letterhead stationery for a school club.
- Print publicity for a school event such as a career day, concert, science fair, or awards ceremony.
- Volunteer to print flyers, bulletins, and news releases for your church or temple, or for a community organization.

Use the silk-screen process to print a poster, greeting card, or gift enclosure. Design and print holiday wrapping paper.

Set up a printing business as a class project under the Junior Achievement (JA) program. This program

Mr. Petrocelli helps an assistant with layout work.

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gives high school students a chance to operate an actual business. JA printing companies typically do job printing or publish local newspapers or magazines. For information, write to Junior Achievement, Inc., 550 Summer Street, Stamford, Connecticut 06901.

Your school system, or a nearby community college or technical institute, may offer courses in printing or graphic arts. If so, invite one of the instructors to speak to your class. Prepare questions in advance on the kinds of printing jobs there are in your community, and the training they require.

Join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as offset printing.

Invite a local representative from the International Typographical Union to speak to your class about apprenticeship opportunities in the printing industry in your community.

If you are a Boy Scout, try for the merit badge in Printing.

Computers and electronics are changing printing methods. Hobbies in these areas provide a good background for a career in the printing industry.

- Do a project on electronics or computers for a science fair.
- Join an Electronics or Computer Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Knowledge of photography is increasingly important in the printing industry.

- Learn how to take pictures with a 35-mm camera.
- Join a Photography Explorer Post, if there is one in your area.
- If you are a Boy Scout, try for a merit badge in Photography.
- If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops also offer proficiency badges in a number of areas, including photography.

Artistic ability is necessary for the compositor in a small shop who does layout work. Design a collage or poster for a school activity or a community event.

As a project for an English or art class, set up a display of different types of printed material: Books, magazines, newspapers, flyers, matchbook covers, labels on containers and packages. For each item in your display, identify the type size and typeface. The library has books on typography that will help.

Use the topic of metrics in the graphic arts and printing trades for a report in a mathematics class. You might begin your research by writing for information to the Office of Weights and Measures, National Bureau of Standards, Washington, D.C. 20234. They also will supply a list, by State, of speakers to talk about the metric system.

As a project for an English or social studies class, report on the role of newspapers and the printing industry during the American Revolution.

Write for information on careers in the printing industry to the American Newspaper Publishers Association, The Newspaper Center, Post Office Box 17407, Dulles International Airport, Washington, D.C. 20041 and to the Graphic Arts Technical Foundation, Education Council of the Graphic Arts, 4615 Forbes Avenue, Pittsburgh, Pennsylvania 15213.

Related Occupations

The compositor handles only one step of a printing job. The work of other people in printing and publishing occupations is described below. If you need to, refer to the list of job titles at the end.

1. I run the printing press, inserting print plates into the machine and controlling the ink and paper. I also may have to clean or repair the machine. Who am I?

2. I check the type for all kinds of errors, such as spelling, grammar, punctuation, and margins. Who am I?

3. I make metal printing plates of pictures and other copy that cannot be set in type. Who am I?

4. I make duplicate plates from the forms turned out by the composing room workers. These are used for jobs that demand volume printing, such as books and magazines. Who am I?

5. I operate machinery that folds, sews, staples, and binds printed items. Who am I?

6. I deal with the public, trying to get new business for the printing company. Selling this service requires a knowledge of printing technology and the ability to advise customers about their particular needs. Who am I?

7. I take the manuscript and rough ideas from the client and then plan the design of the job. I prepare the job for the composing room workers. Who am I?

8. I oversee the entire production process, following each job from the planning stage to the delivery to the customer. I must see that we stick to the budget and time schedule set up for every job we do. Who am I?

Bookbinder

Production manager

Electrotyper

Printing press operator

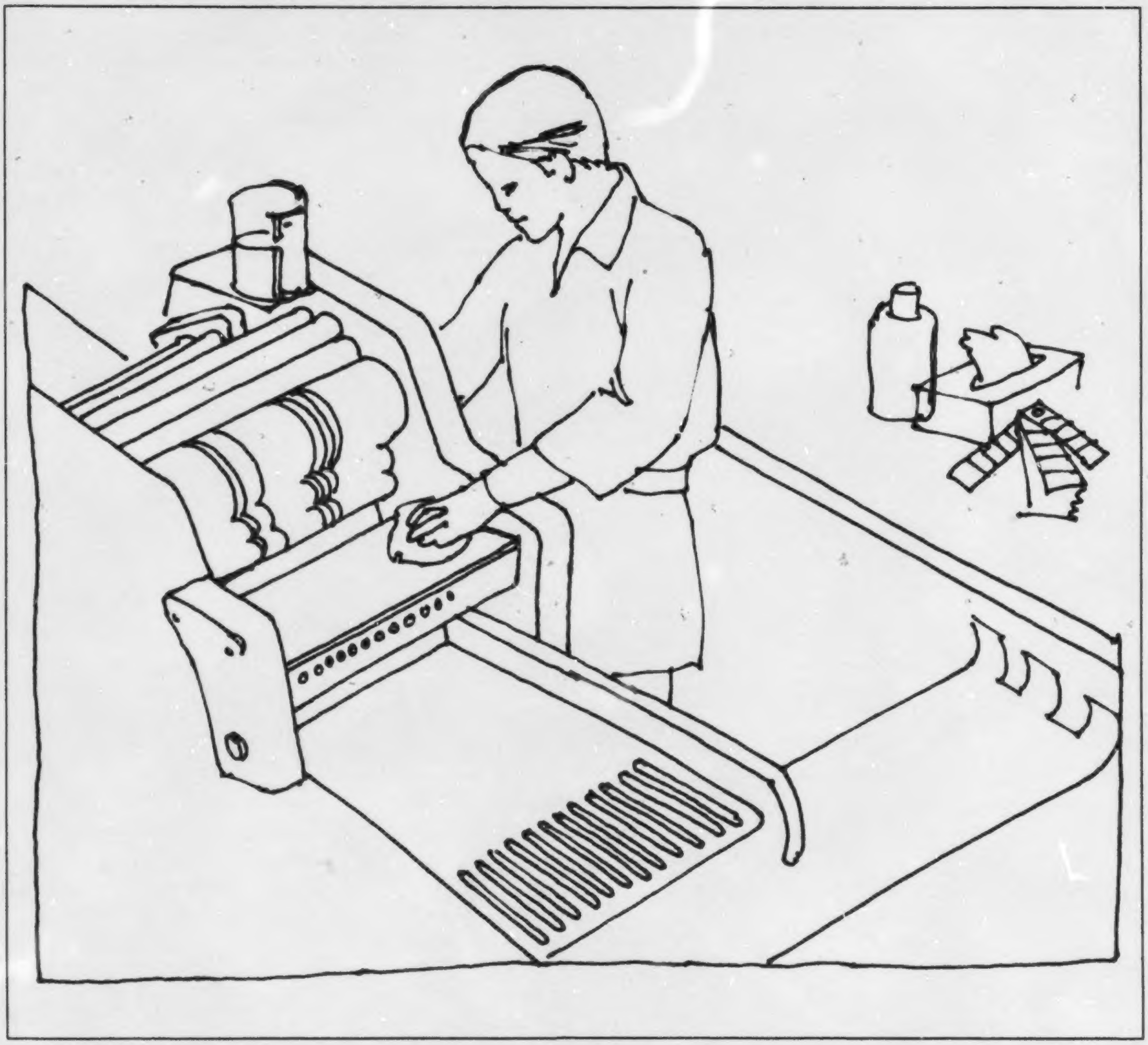
Proofreader

Layout artist

Photoengraver

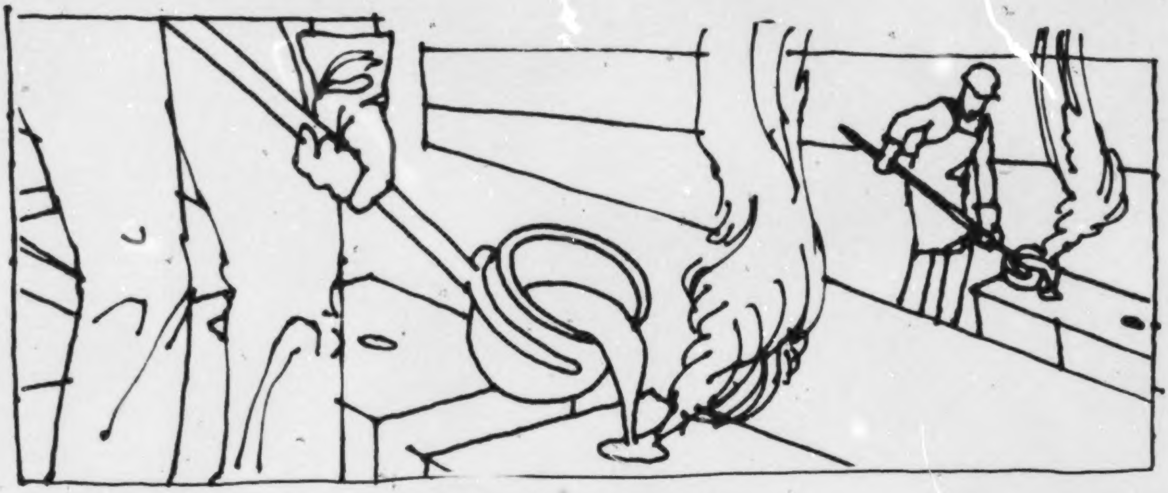
Printing sales representative

See answers at the end of chapter.



Industrial Production Occupations

Job Facts



There isn't room in this book for a story about every industrial production occupation. However, you'll find some important facts about 33 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
FOUNDRY OCCUPATIONS			
Patternmakers	Foundry patternmakers are highly skilled craftworkers. They make the metal or wood patterns that are used in producing industrial and household goods from metal castings. Most patternmakers work in shops that make and sell castings. The rest work in plants that make castings to use in their final products, such as plants operated by manufacturers of automobiles or machinery.	Precision, accuracy, and manual dexterity are very important. Patternmakers work from blueprints and check dimensions with instruments such as micrometers and calipers. To read blueprints, they must be able to visualize objects in three dimensions. Apprenticeship, usually lasting 5 years, is the best way of learning to be a patternmaker. A few apprenticeships last only 3 or 4 years. Although it is difficult to learn the trade on the job, some skilled machinists transfer to metal patternmaking with additional on-the-job training and experience. Employers almost always require apprentices to have a high school education. Vocational and technical school training in patternmaking, metalworking, and machining may be credited toward completion of the apprenticeship.	Patternmakers work indoors in well-lighted, well-ventilated areas and are not exposed to the heat and noise of the foundry floor. Although not strenuous, patternmaking requires considerable standing and moving about. Because patternmakers learn either basic metalworking or woodworking they are qualified for related jobs—as machinists or cabinetmakers, for example.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Molders	Molders make sand molds for use in producing metal castings. Most are machine molders; they operate molding machines that pack and ram the sand mechanically. Others are hand molders, and use manual methods and power tools to construct sand molds. Molders work in shops that make and sell castings, or in plants that make castings to use in their final products.	People become skilled hand molders by completing a 4-year apprenticeship program or learning the work informally through on-the-job training. Less skilled hand molding jobs and most machine molding jobs can be learned with 2 to 6 months of on-the-job training, but employers prefer those with apprenticeship training. While an eighth grade education usually is the minimum requirement for apprenticeship, many employers prefer high school graduates.	Working conditions vary. In older foundries, work is performed in a dusty, noisy, dirty, hot atmosphere. In foundries with improved ventilation and air-conditioning, there is much less heat and dust. The work is physically demanding and may be hazardous at times. Molders must be careful to avoid burns from hot metal.
Coremakers	Coremakers prepare the "cores" that are placed in molds to form the hollow sections in metal castings. Cores are made either by hand or by machine. When hand methods are used, the coremaker uses mallets and other handtools to pack sand into the corebox. Machine coremakers operate machines that pack the sand. Coremakers work in shops that make and sell castings or in plants that make castings to use in their final products.	People become skilled hand coremakers by completing a 4-year apprenticeship program, or learning the work informally through on-the-job training. Apprenticeships also are sometimes required for more difficult machine coremaking jobs. Apprenticeships in coremaking and molding often are combined. While an eighth grade education usually is the minimum requirement for coremaking apprentices, most employers prefer apprentices who are high school graduates.	Coremaking is one of the least hazardous foundry jobs.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
MACHINING OCCUPATIONS			
All-round Machinists	Machinists are skilled metalworkers. They use metalworking machines of various kinds to make and repair metal parts, tools, and machines. Most machinists work in factories that produce metal products such as automobiles and machinery. Almost every factory using substantial amounts of machinery employs all-round machinists to maintain its mechanical equipment. The Federal Government employs machinists in Navy Yards and other places. Leading areas of employment are Los Angeles, Chicago, New York, Philadelphia, Boston, San Francisco, and Houston.	Precision and accuracy are very important. Machinists consult blueprints before beginning to make a machined product, and check the results with precision instruments such as micrometers. A 4-year formal apprenticeship is the best training, although many machinists learn this trade on the job. A high school or vocational school education is desirable.	All-round machinists can operate most types of machine tools, whereas machine tool operators generally work with one kind only. Machinists must follow strict safety regulations when working around high-speed machine tools. Short-sleeved shirts, safety glasses, and other devices are required to reduce accidents. Opportunities for advancement are good. With additional training, machinists can become tool-and-die makers. Skilled machinists can open their own shops. Many machinists are members of unions.
Instrument Makers (Mechanical)	Instrument makers work with scientists and engineers to translate designs and ideas into experimental or custom-built mechanical equipment. Most of them work for firms that manufacture instruments or for research and development laboratories that make special devices for scientific research. The Federal Government also employs instrument makers. The main centers of instrument making are in and around New York, Chicago, Los Angeles, Boston, Philadelphia, Washington, Detroit, Buffalo, and Cleveland.	Precision and accuracy are important, for instrument makers often work to very fine tolerances. They need spatial and reasoning ability, plus imagination and resourcefulness, for they often work from rough sketches or ideas rather than detailed blueprints. Some instrument makers advance from the ranks of machinists or skilled machine tool operators by completing 1 or 2 years or more of instrument shop experience. Others learn their trade through 4-year apprenticeships. Employers generally prefer high school graduates for apprenticeship programs, and additional technical school training is desirable.	Instrument assembly rooms are sometimes known as "white rooms" because almost sterile conditions are maintained. Serious work accidents are not common, but safety rules require the wearing of certain apparatus and clothing. Many instrument makers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Machine Tool Operators	These workers use machine tools such as lathes, drill presses, milling machines, grinding machines, and punch presses to shape metal. Most work in factories that produce metal products, transportation equipment, and machinery. Skilled machine tool operators also work in production departments, maintenance departments, and toolrooms. Employment is concentrated in major industrial areas including the Great Lakes region, Los Angeles, Philadelphia, St. Louis, and Indianapolis.	Machine tool operators usually learn their skills on the job. Most are semiskilled operators; they perform simple repetitive operations that can be learned in just a few months. Becoming a skilled operator often requires 1 to 2 years of experience and on-the-job training. Some companies have formal training programs for new employees. Although no special education is required, courses in mathematics and blueprint reading are helpful.	Most operators stand a great deal of the time and work in a relatively small space. Machine tool operators have job titles that refer to the machine they operate: Drill press operator, milling machine operator, and the like. Skilled machine tool operators may become all-round machinists, tool-and-die makers, or advance to machine maintenance jobs. Most machine tool operators belong to unions.
Setup Workers (Machine Tools)	These skilled workers, often called machine tool job setters, prepare large complex tools such as a drill press or lathe for use. They consult blueprints, written specifications, or job layouts; select and install proper cutting or other tools; and adjust guides, stops, and other controls. They explain to semiskilled operators how to run the machine. They work in factories that manufacture fabricated metal products, transportation equipment, and machinery. Employment is concentrated in major industrial areas including Los Angeles, Philadelphia, New York, Chicago, Detroit, and Cleveland.	They must meet the same qualifications as all-round machinists. Good judgment is needed to select the sequence of operations so that metal parts will be made according to specifications. The ability to communicate clearly is important in explaining the machinery operations to semiskilled workers. Setup workers may advance to shop supervisor or transfer to other jobs such as parts programmer.	Because they work with high-speed machine tools that have sharp cutting edges, setup workers must follow certain safety practices. Many setup workers are members of unions.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Tool-and-Die Makers	These highly skilled, creative workers produce tools, dies, and special guiding and holding devices used by other machining workers to mass-produce metal parts. They have a broad knowledge of machining operations, mathematics, and blueprint reading; use almost every type of machine tool and precision measuring instrument; and do repair work. Most work in plants that produce manufacturing, construction, and farm machinery. Others work in automobile, aircraft, and other transportation equipment industries, small tool-and-die shops, and electrical machinery and fabricated metal industries. About one-fifth work in the Detroit and Flint, Chicago, and Los Angeles areas. Employment also is concentrated in Cleveland, New York, Newark, Dayton, and Buffalo.	Mechanical ability, finger dexterity, an aptitude for precise work, and a good working knowledge of mathematics and physics are important. They obtain their skills in a variety of ways including formal apprenticeship, vocational school, and on-the-job training. A 4-year apprenticeship probably is the best way to learn the trade. Most employers prefer persons with high school or trade school education for apprenticeships. Several years of experience after apprenticeship often are necessary to qualify for more difficult work. Some advance to supervisory and administrative positions in industry; many become tool designers; others open their own shops.	Because of their extensive skills and knowledge, tool-and-die makers are able to change jobs within machining occupations more easily than less skilled workers. As with other machining workers, they wear protective glasses when working around metal-cutting machines. Tool-and-die shops usually are safer than similar operations in production plants. Many are members of unions.
PRINTING OCCUPATIONS			
Compositors	Compositors set type. Nearly all compositors use machines and press keys similar to a typewriter's. Type is set by hand only for very special printing jobs. Most compositors work for newspaper plants, or for commercial printing plants, book and magazine printers, and printing plants. Some work for banks, insurance companies, advertising agencies, manufacturers, and other firms that do their own printing.	Skilled compositors usually learn their trade through a 6-year apprenticeship. This period may be less for apprentices who have already worked in the printing industry. Shorter apprenticeships also are customary for people who have had courses in printing technology. Applicants for apprenticeship generally must be high school graduates. Courses in mathematics and English, especially spelling, are important, and a background in electronics and photography is increasingly useful.	Working conditions vary from plant to plant. Some are hot and noisy. In general, new plants are well-lighted and clean. Many compositors are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Lithographers	Lithography, also known as offset printing, is a printing process in which the material to be printed is either drawn or reproduced photographically on a flat metal plate. Then the plate is treated chemically so that the printing areas will attract ink while the nonprinting areas repel it and stay blank. Lithographic workers specialize in different steps of the printing process. Some are camera operators; others are artists, strippers, or platemakers. Lithographers work for commercial printing plants, newspapers, and book and magazine printers. Some work for the U.S. Government Printing Office.	Lithographic craft workers usually must complete a 4- or 5-year apprenticeship program. Apprenticeship applicants usually must be high school graduates and at least 18 years old. Some lithographers learn the craft by taking a 2-year program in printing technology at a technical institute, junior college, or college. High school courses in printing, photography, mathematics, chemistry, physics, and art are helpful.	Although the work is not strenuous, lithographers are on their feet much of the time. They sometimes are under pressure to meet publication deadlines. Many lithographers are union members.
Photoengravers	Photoengravers make metal printing plates of drawings, photographs, and other copy that cannot be set in type. These plates are then printed in the letterpress process. Over half work in shops that make photoengravings for other printing firms. Other employers include newspapers, photoengraver shops, book and magazine printers, and the Federal Government. Some photoengravers have their own shops.	Most learn through a 5-year apprenticeship program. Apprenticeship applicants must be at least 18 years old and generally must have a high school or vocational school education.	Although the work is not strenuous, photoengravers stand up much of the time. Good eyesight is particularly important because of the close work and color discrimination involved. Most photogravers are union members.
Electrotypers and Stereotypers	These workers make duplicate press plates of metal, rubber, and plastic for letterpress printing. Duplicate plates are used when there is a large volume of printing to be done. Electrotypers work mostly in plants that print books and magazines. Most stereotypers work for newspaper plants. Electrotypers and stereotypers also are employed in shops that provide this service for printing firms.	Nearly all complete 5- to 6-year apprenticeships. Electrotyping and stereotyping are separate crafts and relatively few transfers take place between the two. Apprenticeship applicants must be at least 18 years old.	Although operations are highly mechanized, some lifting of heavy press plates occasionally is required. Nearly all electrotypers and stereotypers are union members.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Printing Press Operators	These workers set up, adjust, and operate offset, letterpress, and gravure printing presses. Over half work in commercial printing plants or in the printshops of book, newspaper, and magazine publishers. Others work for banks, insurance companies, manufacturers, and other organizations that do their own printing.	Most press operators learn through apprenticeship, while some learn as helpers or press assistants. Others obtain their skills through a combination of work experience and vocational or technical school training. The length of apprenticeship and the content of training depend largely upon the kind of press used in the plant. Apprenticeships in commercial shops generally last 2 years for press assistants and 4 to 5 years for press operators. Mechanical aptitude is important in making press adjustments and repairs. The ability to visualize color is essential for work on color presses. Physical strength and endurance are needed for work on some kinds of presses, where operators lift heavy plates and stand for long periods.	Pressrooms are noisy and workers in some areas wear ear protectors. Press operators are subject to hazards when working near machinery. They sometimes work under pressure to meet deadlines. Many pressroom workers are union members.
Bookbinders and Bindery Workers	Bookbinders glue, sew, or staple the pages and the covers together to produce a book. They operate machines and do some of the work by hand. Many work in shops that specialize in bookbinding. Others work in bindery departments of book publishing firms, commercial printing plants, and large libraries. Some skilled bookbinders work in hand binderies. They design original bindings for a limited number of copies of a large edition, or restore and rebind rare books.	A 4- or 5-year apprenticeship generally is required to qualify as a skilled bookbinder. Apprenticeship applicants usually must have a high school education and be at least 18 years old. Although most bindery workers learn their tasks through on-the-job training lasting from several months to 2 years, many learn through formal apprenticeship. Accuracy, patience, neatness, and good eyesight are qualities needed by bookbinders. Good finger dexterity is necessary for workers who count, insert, paste, and fold.	Bookbinding shops are noisy when machinery is operating. Long periods of standing and constant use of the arms can be tiring. Many bindery workers are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
OTHER INDUSTRIAL PRODUCTION AND RELATED OCCUPATIONS			
Assemblers	Following instructions or diagrams, assemblers put together the parts of manufactured items using hand and machine tools. Many perform a single operation on an assembly line. Others have more complex jobs: Bench assemblers may make steering columns for automobiles, build rifles, or put together the small components used in radios; floor assemblers put together large machinery or equipment on shop floors; highly skilled assemblers may have to wire tubes for a television set or put together and test a calculator. All work in manufacturing plants, almost two-thirds in plants that make machinery and motor vehicles. Over half work in the heavily industrialized States of California, New York, Michigan, Illinois, Ohio, and Pennsylvania.	Speed and accuracy, manual dexterity, patience, good eyesight, and physical fitness may be important. Assemblers often work with very small parts. Floor assemblers may have to lift and fit heavy objects. Skilled assemblers use precision measuring instruments and must know how to read blueprints and other engineering specifications. Inexperienced people can be trained in a few days or weeks. Longer training is required for skilled assembly jobs. High school graduation usually is not required. However, some employers prefer applicants with mechanical aptitude and vocational school training.	Assembly jobs tend to be more monotonous than other blue-collar jobs. Working conditions differ, depending on the job performed. Some work in clean, well-lighted rooms while others work in noisy, dirty areas. Some are under pressure to keep up with the speed of assembly lines. Work schedules may vary at plants with more than one shift. Many assemblers are members of unions.
Automobile Painters	These skilled workers repaint older vehicles that have lost the luster of their original paint and make body repairs almost invisible. They remove old paint by sanding, fill nicks and scratches with body putty, and mix paints when necessary. Almost two-thirds work in shops that specialize in automobile repairs. Most others work for automobile and truck dealers. Some work for organizations that maintain and repair their own fleets of vehicles, such as trucking companies and buslines. Many experienced painters open their own shops.	Good health, keen eyesight, and a good color sense are very important. Agility also is vital as they often bend and stoop to reach all parts of the car. Most auto painters start as helpers and gain skills by working with experienced painters. Becoming highly skilled requires 3 to 4 years of on-the-job training. A few learn by completing 3-year apprenticeship programs. High school graduation is not required, but may be an advantage since it shows reliability and perseverance. Experienced painters may advance to shop supervisor, while those with the necessary funds open their own shops.	They may wear protective equipment because of fumes. Many painters belong to unions.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Blacksmiths	Blacksmiths make and repair equipment and other items made of metal. Those who specialize in shoeing horses are called farriers. Almost two-thirds work in factories, railroads, and mines. The remainder work in small shops, and most are self-employed. Most farriers are self-employed and contract their services to horse trainers at racetrack stables and to owners of horses used for private or public recreation.	Good physical conditioning is important because pounding metal and handling heavy tools and parts require strength and stamina. Farriers must have the patience to handle horses. Many beginners enter the occupation by working as helpers. Others complete 3- or 4-year apprenticeship programs that teach blueprint reading, proper use of tools and equipment, heat-treatment of metal, and forging methods. Many farriers learn by assisting experienced workers. Some take courses in horseshoeing at a college or private horseshoeing school. At least 3 to 5 years of experience are required to obtain skills necessary to shoe racehorses. Farriers who wish to work at racetracks must pass a licensing exam.	A blacksmith's job may be hazardous. Blacksmiths are subject to burns from forges and heated metals and cuts and bruises from handling tools. They often wear protective devices. Some farrier jobs are seasonal and may involve long hours, weekend work, and much travel. Many blacksmiths belong to unions.
Blue-Collar Worker Supervisors	These workers train new employees, maintain employee and production records, plan and schedule work, and prepare reports on production, cost, personnel, and safety. Over half work in manufacturing, supervising the production of cars, washing machines, or any of thousands of other products. Most of the remainder work in the construction industry, in wholesale and retail trade, and in public utilities.	Most supervisors are promoted through the ranks. Experience, skill, and leadership qualities are vital. Employers place special emphasis on the ability to motivate employees, maintain high morale, command respect, and get along with people. Completion of high school is the minimum educational requirement. A college or technical school background can be helpful, particularly in industries with highly technical production processes.	Supervisors generally work more than 40 hours a week and sometimes do paperwork at home. They may receive overtime pay. Working conditions vary and some are subjected to noisy, dirty conditions. On the other hand, they have more challenging and prestigious jobs than most blue-collar workers.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Boilermaking Occupations	Boilermakers assemble, erect, dismantle, and repair boilers and other pressure vessels. They use power tools and devices such as oxyacetylene torches, welding equipment, power shears, and rigging equipment. Layout workers follow blueprints in marking off lines on metal plates and tubes. Fitters see that boiler parts fit together properly before assembly. Boilermakers work in the construction industry, in iron and steel plants, petroleum refineries, railroads, shipyards, and electric powerplants. Some work in Navy shipyards and Federal powerplants. Layout workers and fitters work mainly in plants that make fire-tube and water-tube boilers, heat exchangers, heavy tanks, and similar products.	Physical strength and stamina are required to do the heavy work, and manual dexterity and mechanical aptitude are needed to handle tools. Many people have become boilermakers by working for several years as helpers to experienced boilermakers, but a 4-year apprenticeship is considered the best way to learn this trade. Most layout workers and fitters are hired as helpers to experienced workers, and they take about 2 years to become highly skilled. Employers prefer high school or vocational school graduates as apprentices or helpers.	The work may be hazardous. Boilermakers often work in damp, poorly ventilated, cramped quarters and sometimes at great heights. Workers often wear protective equipment. Most workers belong to unions.
Boiler Tenders	Boiler tenders operate and maintain the steam boilers that power industrial machinery and heat factories, offices, and other buildings. They also may operate waste heat boilers that burn trash and other solid waste. About half work in factories. Plants that manufacture lumber, iron and steel, paper, chemicals, and stone, clay, and glass products are among leading employers. Others work for public utilities and in hospitals, schools, and Federal, State, and local government.	Persons learn through on-the-job training as a helper in a boiler room. Some high school courses are helpful. Applicants for helper jobs should be in good physical condition and have mechanical aptitude and manual dexterity. Some large cities and a few States require boiler tenders to be licensed. Two types of licenses exist—for low pressure and high pressure boilers. Because of regional differences in licensing requirements, one who moves to another city or State may have to pass an exam for a new license.	They have to work in awkward positions and may be exposed to noise, heat, grease, fumes, and smoke. They also are subject to burns, falls, and injury from defective boilers or moving parts. Modern equipment and safety procedures, however, have reduced accidents. Some boiler tenders are union members.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Electroplaters	Electroplaters use an electrochemical process to give metal articles such as silverware, jewelry, and jet engine parts a protective surface or an attractive appearance. About half work in shops that specialize in metal plating and polishing. Other platers work in plants that make plumbing fixtures, cooking utensils, household appliances, electronic components, motor vehicles, and metal products.	An eye for detail, patience, manual dexterity, and good eye-hand-arm coordination are important. They must carefully study job specifications for each item to be plated and must examine their work for defects. In addition, good physical condition is important as workers may have to lift and carry heavy objects at times. Most learn by helping experienced workers, and it usually takes at least 3 years to become an all-round plater. A small proportion work for 3 or 4 years as apprentices. Some high school or vocational school courses are helpful, and a few people take a 1- or 2-year electroplating course in a junior college, technical institute, or vocational high school.	The work may be hazardous. They are subject to burns from splashing acids and inhalation of toxic fumes. Humidity and odors also are problems. Workers may wear protective clothing. Some platers are members of unions.
Furniture Upholsterers	Furniture upholsterers repair or replace fabrics, springs, padding, and other parts of furniture that are worn or damaged. They use tack and staple removers, pliers, hammers, hand or power shears, webbing stretchers, upholstery needles, and sewing machines. Over three-fourths own and operate or work in small upholstery shops. Some work in furniture stores and for businesses, such as hotels, that maintain their own furniture.	Manual dexterity, coordination, an eye for detail, good color sense, patience, and a flair for creative work are helpful. Occasional heavy lifting may be required. Most people complete about 3 years of on-the-job training before becoming fully skilled. Vocational or high school courses in upholstery are helpful.	Working conditions vary. Some shops are large and clean while others are small and dusty. Workers stand while they work and do stooping, bending, and some heavy lifting. Some upholsterers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Forge Shop Occupations	Before metal can be shaped, it must be heated in intensely hot furnaces (forges) until it is soft. Forge shop workers place the heated metal between two metal dies that are attached to power-presses or hammers. The hammers or presses pound or squeeze the metal into the desired shape. Hammersmiths direct the operation of open die power hammers; hammer operators manipulate impression die power hammers; press operators control huge presses equipped with dies; upsetters operate machines that shape hot metal; heaters control furnace temperatures; inspectors examine forged pieces for accuracy, size, and quality; die sinkers make impression dies for forging hammers and presses; trimmers, grinders, sandblasters or shotblasters, picklers, and heat treaters are involved in cleaning and finishing operations. About three-fourths work in shops that make and sell forgings. The remainder work in plants that use forgings in their final products, such as plants operated by manufacturers of automobiles, farm equipment, and handtools. Employment is concentrated in and around Detroit, Chicago, Cleveland, Los Angeles, and Pittsburgh.	Forge shop workers must be strong enough to lift and move heavy forgings and dies. They need the stamina and endurance to work in the heat and noise of a forge shop. Most learn their skills on the job. They generally join hammer or press crews as helpers or heaters, and progress to other jobs as they gain experience. Some forge shops offer 4-year apprenticeship programs for skilled jobs such as die-sinker, heat treater, hammer operator, hammersmith, and press operator. Training requirements for inspectors range from a few weeks to several months of on-the-job training. Employers usually do not require a high school diploma, but graduates may be preferred.	The work is more hazardous than most manufacturing occupations. Workers are subject to noise, vibration, heat, and smoke. Workers may wear protective equipment. Most workers are union members.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Inspectors (Manufacturing)	Inspectors make certain that products meet specifications. For example, they may taste-test soft drinks, use tools such as gauges and magnifying glasses to make sure airplanes are assembled properly, or examine a jacket for flaws. Two-thirds work in plants that produce durable goods such as machinery, transportation equipment, electronics equipment, and furniture. Others work in plants that produce goods such as textiles, apparel, and leather products. Almost two-thirds work in Ohio, New York, Michigan, Illinois, Pennsylvania, California, New Jersey, North Carolina, and Indiana.	Inspectors generally are trained on the job for a brief period—from a few hours or days to several months, depending on the skill requirements. Preferences of employers vary widely with respect to education, experience, and qualifying aptitudes. Good health and eyesight, accuracy, and the ability to pay attention to detail, work with numbers, and get along with people may be important.	Working conditions vary considerably. Some have well-lighted, air-conditioned workplaces while others are exposed to high temperature, oil, grease, and noise. Many inspectors are members of unions.
Millwrights	Millwrights prepare machinery for use in a plant. This may involve constructing concrete foundations or wooden platforms, dismantling existing equipment, and moving, assembling, and maintaining machinery. Most work for manufacturing companies. The majority are in transportation equipment, metal, paper, lumber, and chemical products industries. Others work for contractors in the construction industry; machinery manufacturers employ a small number. Employment is concentrated in Detroit, Pittsburgh, Cleveland, Buffalo, and the Chicago-Gary area.	Mechanical aptitude is vital because millwrights work with various tools while putting together and taking apart complex machinery. Strength and agility also are important because millwrights do much lifting and climbing. The ability to give and carry out instructions accurately and analyze and solve problems also is important. Some spend 6 to 8 years learning the trade informally on the job as helpers to skilled workers. Others complete 4-year formal apprenticeship programs. Applicants for apprentice or helper jobs must be at least 17 years old. Some employers prefer high school or vocational school graduates.	The work may be hazardous, and workers wear protective devices. In addition to the dangers of being struck by falling objects or machinery or falling from high places, millwrights are subject to the usual hazards of cuts and bruises. Millwrights employed by factories generally work year round. Those employed by some construction companies may experience periods of unemployment. However, they usually earn higher wages. Frequently these millwrights travel. Most millwrights belong to unions.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Motion Picture Projectionists	Motion picture projectionists operate and maintain movie projectors and sound equipment. They may inspect film, load and start the machine, adjust light and sound, make the changeover to a second machine at the end of a reel, rewind film, splice film when required, and make repairs. Many of these functions are automated in modern theaters. The majority work for indoor theaters. Most of the remainder work for drive-ins, while some work for large manufacturing companies, colleges, television studios, and Federal, State, and local governments.	Good eyesight and normal color perception, good hearing, manual dexterity, mechanical aptitude, and a temperament for performing routine work alone are important. Most theaters are unionized, and union membership requirements vary considerably among the locals. Applicants often must work for trial periods lasting several weeks or complete union training programs without compensation. They may have to pass a written exam before becoming a union member. Unions prefer high school graduates. In a few cities and States, projectionists must be licensed, often before applying for union membership.	Most work evenings on weekdays, generally 4 to 6 hours, and 10 hours or more on Saturdays or Sundays. Some work at several theaters. In small towns, they usually work only part time because of the small number of shows. Those at drive-ins, particularly in northern States, may be laid off during the winter. The work is not strenuous and is relatively safe, but there is the danger of electrical shock and acid burns from the projector's lamp.
Ophthalmic Laboratory Technicians	Ophthalmic laboratory technicians (also called optical mechanics) make eyeglasses. The two types of technicians are surfacer (lens grinder) and bench technician (finisher). In small laboratories, one person may perform both functions; in large laboratories, these duties may be performed by several people. Most work in ophthalmic laboratories but some work for retail optical dispensaries or other stores that sell prescription lenses. A few work for eye physicians or optometrists who dispense glasses directly to patients.	Because they work with machines and small handtools, finger dexterity, some mechanical ability, patience, and a liking for precision work are important. The vast majority learn their skills on the job, usually taking 3 years to become all-round mechanics. High school graduates may learn by completing 3- to 4-year apprenticeship programs, and most authorities agree that this training leads to more opportunities. Some technicians receive training in the Armed Forces or complete 9-month vocational school programs and then receive on-the-job training. Employers prefer high school graduates. Some States require licenses.	Work surroundings are noisy because of power grinding and polishing machines. Some technicians are members of unions.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Photographic Laboratory Occupations	Photographic laboratory workers develop film, make prints and slides, and perform related tasks such as enlarging and retouching photographs. All-round darkroom technicians can perform all the tasks necessary to develop and print film. Color technicians specialize in processing color film. Darkroom technicians are assisted by specialized workers such as developers, printers, and retouchers. Other workers include film numberers, who sort film according to the type of processing needed; film strippers, who unwind rolls of film and place them in developing machines; printer operators, who operate machines that expose rolls of photographic paper to negatives; machine print developers, who operate machines that develop these rolls; chemical mixers, who combine chemicals that make up developing solutions; slide mounters, who operate machines that cut, insert, and seal slides in mounts; and photocheckers and assemblers, who inspect finished slides and prints and package them for customers. Most semiskilled workers are employed by large photofinishing labs that specialize in processing film for amateur photographers. A large proportion of darkroom technicians work in labs operated by portrait and commercial studios, manufacturers, newspaper and magazine publishers, advertising agencies, and other organizations. Some work in commercial labs specializing in processing work of professional photographers.	For many photography laboratory jobs, manual dexterity, good vision, including normal color perception, and good hand-eye coordination are important. Most darkroom technicians learn their skills on the job, taking about 3 years to become fully qualified. Employers prefer high school graduates. Training is offered in high schools, trade schools, and the Armed Forces. A few colleges offer 2-year programs in photographic technology. Semiskilled photolab workers train on the job for a few weeks to several months. Many darkroom technicians eventually become professional photographers.	In some labs, employees may work much overtime during the summer and other peak periods, and temporary workers may be employed during these peaks. In many semiskilled occupations, the work is repetitious and the pace is rapid. Some workers are subject to eye fatigue.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Power Truck Operators	Power truck operators drive trucks with lifting mechanisms to move heavy materials. Operators must follow special procedures when using a truck at a plant, warehouse, or construction site. They may manually load and unload, keep records of materials moved, and maintain trucks in good working condition. About three-fourths work in manufacturing industries. Many work in plants that make automobiles, machinery, fabricated metal products, paper, building materials, and iron and steel. Many also work in warehouses, depots, freight and marine terminals, and mines.	Operators need manual dexterity, strength, and stamina to drive the truck and to load and unload goods. They need good eyesight, including good depth perception, to pick up, move, and deposit loads. They often need mechanical ability to perform minor maintenance. Large firms generally require applicants to pass a physical examination. They train on the job for several days, but it usually takes several weeks to reach maximum efficiency.	Work may be hazardous, and operators may be exposed to all kinds of weather. Operators are subject to collisions and falling objects; some transport dirty material. However, working conditions are being improved.
Production Painters	Production painters apply varnish, lacquer, paint, and other finishes to the surface of manufactured items. Most painters use sprayguns while others use automatic equipment such as spraying machines, dipping tanks, and tumbling barrels. They may use masking tape to prevent colors from overlapping, mix paint, and clean equipment. As production lines become more automated, painters must learn to use modern machinery such as electrostatic applicators and powder-type painting systems. About two-thirds work in plants that make automobiles, machinery, furniture and other wood products, or manufactured metal products such as cans, tinware, and handtools.	Production painters need good eyesight to distinguish colors and check for even application of paint. The job also demands a tolerance for repetitious work and good physical condition since painters stand for long periods of time and often work in awkward and cramped positions. No formal apprenticeship or training exists. Workers may spend from a few days to several months acquiring their skills on the job. High school graduation may be needed for advancement. A few painters become supervisors.	The job may be hazardous as painters are exposed to fumes and noises. Workers may wear protective clothing and apparatus. Some painters are union members.

Industrial Production Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Stationary Engineers	Stationary engineers operate boilers, generators, turbines, condensers, and other equipment that provide power, heat, air-conditioning, and light. They regularly inspect equipment, check meters and gauges, and make minor repairs. They may supervise others. Places of employment include power stations, factories, sewage and water treatment plants, offices and apartment buildings, hotels, hospitals, and Federal, State, and local governments.	Good physical condition is important because these workers may crawl inside boilers and work in crouching or kneeling positions. Mechanical aptitude, manual dexterity, and accuracy also are important. Many start as helpers or oilers and acquire their skills on the job. A good background can be obtained in the Navy or Merchant Marine. However, most training authorities recommend a formal 4-year apprenticeship. High school or trade school graduates are preferred for apprenticeship. Many States and localities have licensing requirements. Although licensing requirements differ from place to place, applicants usually must be 18 years old, reside for a specified period in the area in which the exam is given, meet experience requirements, and pass a written exam. One who moves to another area may have to obtain a new license.	Workers may be assigned to any one of three shifts around the clock, and to weekend and holiday work. In many plants, only one engineer works on each shift. The work may be hazardous as workers may be exposed to heat, dust, dirt, oil and grease, and fumes or smoke. They also are subject to burns, electric shock, and injury from moving machinery. Some stationary engineers are union members.
Wastewater Treatment Plant Operators	Wastwater treatment plant operators control and maintain pumps, pipes, and valves that send harmful domestic and industrial waste to treatment facilities. They may read and interpret meters and gauges to check plant equipment; operate chemical feeding devices to remove pollutants; take samples of water for laboratory analysis; and test and adjust the level of chlorine in the water. They keep records and may make minor repairs using a variety of tools. Most work in municipal plants and private industry while some work in Federal installations.	Mechanical aptitude and competence in basic mathematics are important. Operators also must be agile as they must climb ladders and move easily around heavy machinery. Trainees start as helpers and learn their skills on the job. Employers prefer high school graduates and in some States this is a minimum requirement. Some 2-year associate degree programs in wastewater technology are available. In many States, supervisors and certain operators must pass an exam to certify that they are capable of overseeing plant operations. There are different classes of certification for different sizes of plants. These also may entail education and experience requirements.	Many operators in small towns work part time. They work different shifts and may have to work overtime in an emergency. They may be exposed to odors, as well as noise from the operation of electrical motors and pumps.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Welders	Welders join two or more pieces of metal by applying intense heat and adding filler materials when necessary. These permanently connected metal parts are then used in the construction of cars, ships, household appliances, and thousands of other products. Jobs vary from those of highly skilled manual welders who can use welding equipment in more than one position and who can plan their work from drawings and other specifications to those of unskilled welding machine tenders who simply press a button to start a machine. Almost two-thirds help manufacture durable goods such as boilers, bulldozers, trucks, ships, and heavy machinery. Most of the remainder repair metal products or help construct bridges, large buildings, and pipelines.	Manual dexterity, good eyesight, and good eye-hand coordination are important. Workers should be able to concentrate on detailed work for long periods, and should be in good physical condition since welders bend, stoop, and work in awkward positions. It takes several years of training to become a skilled welder. Some of the less skilled jobs can be learned in a few months or less. A few companies offer apprenticeship programs. Employers prefer applicants with high school or vocational school training in welding. Some welders may be required to pass certification exams. Welding machine operators may learn skilled welding jobs; skilled welders may be promoted to inspectors, technicians, or supervisors. Experienced workers with college training may become welding engineers, while a few open their own shops.	Welders work in the presence of toxic gases, fumes, rust, grease, and dirt. They wear protective clothing and devices. Many welders are union members.

Answers to Related Occupations

ASSEMBLER

1. Sewing machine operator, 2. Spray painter, 3. Machine cutter, 4. Automatic print developer, 5. Machine packager, 6. Yarn winder, 7. Ampoule filler, 8. Cannery worker, 9. Knitting machine operator.

MACHINIST

1. b, 2. c, 3. g, 4. h, 5. e, 6. d, 7. a, 8. f.

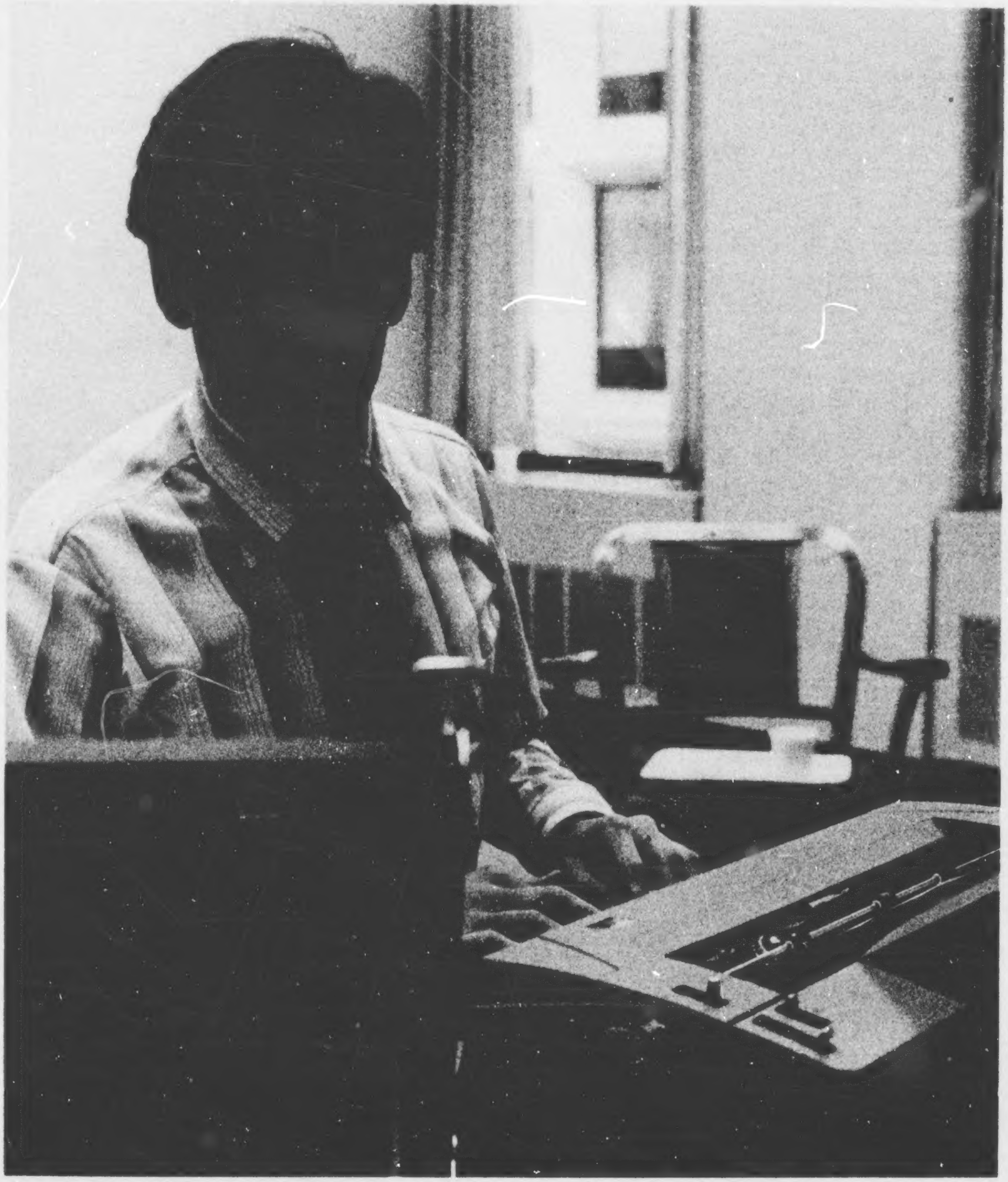
PHOTOCOMPOSITOR

1. Printing press operator, 2. Proofreader, 3. Photoengraver, 4. Electrotyper, 5. Bookbinder, 6. Printing sales representative, 7. Layout artist, 8. Production manager.

Answers to math problems

MACHINIST

1. Three 2-meter bars with 90 centimeters of steel left over. 2. 35 teeth. 3. yes.



Until the middle of the 19th century, clerical work almost always was done by men.

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Danny owns a lunch truck. "Not just any old lunch wagon, but the best rolling cafeteria in the whole city!" he says. Danny sells sandwiches downtown, in the heart of the steel and glass jungle inhabited by the city's office workers. Every Monday through Friday at 11 o'clock in the morning, Danny parks his truck in front of the Benton Building. After loading his special cart with food, he pushes it through the building, selling sandwiches and drinks to the workers there.

Does Danny ever get tired of his job? "No way! You see, people fascinate me. I like talking to them, learning their names, finding out what they do, how many kids they have, everything. Even though I sometimes have to rush to finish my run on schedule, I always manage to find a few minutes to chat. I've been making this run for a couple of years, and I've gotten to know some of these people very well.

"It amazes me how many different kinds of work people do. Now you take this building, for instance. Just 4 floors, no more than 5 or 6 big companies altogether. But I'll bet if you made a list you'd count over 50 different jobs in the Benton Building. All office jobs, but each one different. Some of them I wouldn't mind having myself; some I wouldn't take if they paid me twice as much as I earn now. But even if I wouldn't want their jobs, I never get tired of talking to people and finding out what they do. Why don't you come with me on my run and see what I mean!"

The Commerce National Bank

Danny loads his cart with sandwiches, sodas, pastries, and fruit until it appears ready to spill over. Pushing it towards the double glass doors, he parks it in the lobby next to the Commerce National Bank.

"I've got lots of good customers in this bank," explains Danny as workers leave their desks and crowd around his cart. "Take these two, Burt Lansing and Paula Robinson. They're *tellers*. They act as the bank's cashiers. They take money from people who want to deposit it here. They cash checks and give money to customers who want to withdraw it from their accounts. They handle a lot of money every day, so they've got to be very careful not to make mistakes and not to leave their stations unguarded. If money is missing they might be held responsible.

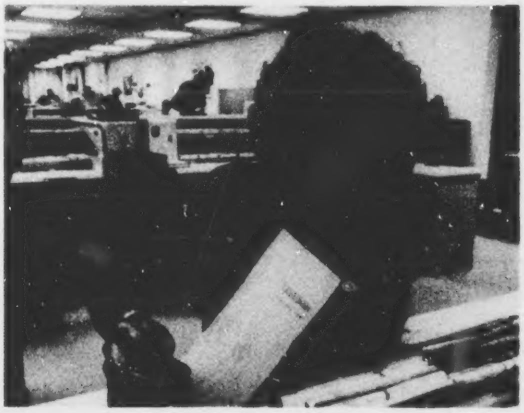
"Paula used to work in a smaller bank than this one. She and the other tellers handled everything—making deposits and withdrawals, selling traveler's checks, writing money orders, taking Christmas club payments. In this big bank, each teller specializes. Paula misses the variety, but her chances of getting ahead are better here. She and Burt both take courses in the evenings to become *loan officers*.

"Burt says the best part of the job is dealing with the public. He likes people. But sometimes it's quite a challenge to be courteous to an angry, unreasonable customer. Believe me, I know! Burt has unlimited patience, though, and he makes a good teller.

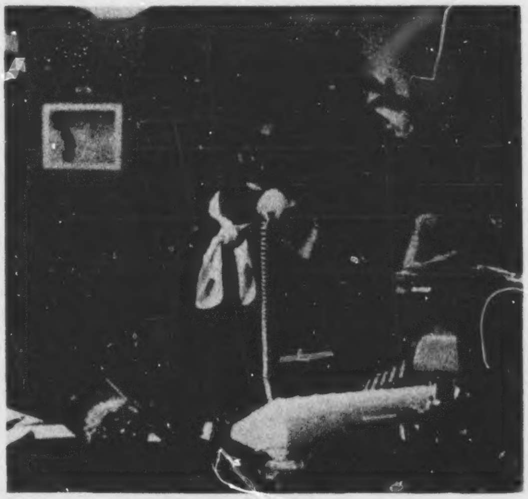
"Most of the people who work in the bank are tellers, like Burt and Paula, or *officers*, or *clerks*. See that fellow in the grey suit? His name's Manuel Ortez. He's a *commercial loan officer*. When business people want to borrow money to build a new store, to buy equipment, or for some other project, he investigates to see whether they'll be able to pay the loan back. If their loan is approved, he discusses with them any problems they might have paying it back. While Manuel handles business loans, other officers specialize in loans to farmers, to people who want to buy land, or to people who want to improve their homes. Manuel is lucky, though, because he has customers all over the country, so he gets to travel more than the others.

"Over there is the woman who hired Manuel, Catherine Wallace. She's a *personnel officer*, and she's been with the bank a long time. She interviews people when there are openings, and hires them if she thinks they'd do a good job at Commerce National. Occasionally she gives an applicant a typing or math skills test. She knows the organization and the personnel policies of this bank backwards and forwards. She knows the laws against discrimination in hiring and promotion. And she knows how to deal with people. That's very important in her work.

"You know, when you walk into a bank like this one, you never see most of the people who make it tick, the *clerks*. They work behind the scenes, processing thou-



The never-ending flow of paperwork in business creates clerical jobs—like this one in a bank.



A pleasant personality is important for receptionists, who represent their employers to the outside world.

sands of little pieces of paper every day. Each of those pieces of paper represents money somebody paid to somebody else, and the bank has to record every one of those payments correctly. Some of the clerks have fancy electronic machines to help them. This fellow, Andy Hayes, for example, is a *reading-sorting clerk*. He operates a machine that prints codes on checks in a special ink so that another machine can read them. Then Andy's machine sorts the checks by the bank they came from. The woman next to him, Christy Ross, is an *interest clerk*. She uses the bank's computer to keep track of how much interest people owe the bank for loans. There are so many other clerks in this bank, it boggles the mind!"

All the time he talks, Danny takes coins and bills and gives change. When everyone has paid, Danny rolls the cart to an elevator and punches the button. "Next stop, the second floor!" he exclaims as he pushes the cart into the open elevator car. Arriving at the next floor, he rolls his cart down the paneled, carpeted hallway toward a large door labeled "All-Risk Insurance."

The All-Risk Insurance Company

"Have you ever visited an insurance office?" asks Danny as he rolls his cart through the doorway into a room with a desk and a leather couch. "Well, step right into the reception area, where you will be greeted by my friend, the *receptionist*! His name is Jim Rodgers," he explains, indicating the man behind the desk. "When visitors come to the office, Jim greets them, asks them whom they came to see, and sends them to the right room. He also answers the phone and switches calls to the proper people. Now and then he helps with typing, too. You find a receptionist in just about every office you walk into. But none of them is as friendly and helpful as Jim!"

Danny smiles as Jim announces his arrival over the intercom. Soon, men and women wander out of the rear of the office and gather around Danny's cart. Once again he takes money and makes change, talking all the while.

"I've already told you about some of the clerical workers who keep things moving at Commerce National. Well, an insurance company needs clerical workers, too. In fact, you'll find clerks wherever you find paperwork or number work, which is just about everywhere! Let me tell you what the clerical workers here at All-Risk do. Those folks standing over there in a group are good examples. The tall fellow is Jeff Graham, a *typist*. He spends most of his time at an electric typewriter, typing forms for insurance policies or claims. That guy can type up a storm—better than 60 words a minute. And he never gets distracted by all the hubbub around him. He just types away, fast and clean.

"The other guy, McCoy Johnson, is a *file clerk*. Now you may think filing is easy, but not in a place like this. They keep information on thousands of people. To organize all that information so it can be found easily, they have a special system. McCoy works like a librarian, and he has to know that system. When someone needs a file, he finds it. He keeps track of who is using it, and puts it back when they're done. And he has to make sure he puts it back in the right place, because otherwise a lot of time could be lost looking for it the next time it's needed.

"That lady talking with Jeff and McCoy is Linda Inouma. She's a *secretary*, and a hard worker, from what I hear. She answers her boss' phone calls, takes dictation, types letters and reports that her boss writes, and takes care of files. I don't know where her boss would be without Linda; a good secretary is awfully important.

"The woman with the cheese sandwich in her hand is Donna Murphy. Donna is a *statistical clerk*. "Statistical" means working with numbers—in this case numbers about people. You see, Donna assists that woman in the white blouse, Betty Fong. Betty is one of All-Risk's *actuaries*. She helps figure out what All-Risk's rates should be.

"It works this way: I want insurance for my truck in case I have an accident. All-Risk decides to insure me, for a price. The greater my chances of having an accident, the higher the price. Right? Right!

"But how do they know my chances of having a wreck? They don't. But they can come up with a pretty

Precise and orderly work habits are a "must" for bookkeepers.

The profession of legal assistant, or paralegal, is quite new.

good estimate by looking at the accident record of lunch truckdrivers as a group. Putting together that information is Betty's job.

"The person who actually decides whether I'm a good risk—which is a short way of saying I'm worth insuring—is the *underwriter.* All-Risk has many underwriters, including that man in the pin-striped suit, Pat Wash. Pat specializes in automobile insurance, while others handle life or health insurance. They all act a bit like private investigators, finding out whether a person or a business is a good risk.

"My neighbor, Judy Schwarz, is a *claim adjuster* for All-Risk. If something happens to you and you want to collect money on your policy, she's the one to see. Let's say you have a policy that protects your home from damage from natural causes. A big windstorm comes and blows your tree over. The tree falls on the roof of your back porch and puts a hole in it. After you call the company, Judy comes out and looks at the damage. First she sees whether the damage is covered under your policy. If so, she estimates the cost of fixing the hole and writes you a check, or maybe arranges to have it fixed.

"Judy doesn't work in this office. She works in one of the many adjustment centers throughout the city. But she actually spends most of her time out checking on claims.

"Of course, not all claims are so simple to adjust. Two years ago, a car hit my truck down on Main Street. The other guy said I ran the red light, but that wasn't true. Since we couldn't agree on who should pay for repairs, the case went to court. My claim adjuster gave the case to the company's legal department, where it was handled by their *lawyers.*

"These two getting coffee, Elisabeth Kahl and Ed Novak, are lawyers. They buy lunch from me when they're too busy to eat out. I guess they have a lot of cases these days. They've been buying my sandwiches for the last 3 weeks! Elisabeth took care of my claim against the so-and-so who hit me 2 years ago. She handled all the court procedures, collected evidence, and argued my case in the courtroom. And I finally got my money!

"Ed and Elisabeth tell me that some lawyers work for large corporations, because big businesses have enough legal matters to keep a lawyer busy full time. But most lawyers work for law firms. Some practice alone, others have partners and assistants. And those lawyers handle lots of matters besides insurance claims. They handle problems concerning divorces, wills, contracts, patents, taxes, and government regulations. And we can't forget criminal cases. Some lawyers never see the courtroom; others seem to live there."

Danny glances at his watch. "Omigosh! I've got to

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stop babbling so much and move on. I'm late!" Packing up the cart again, he wheels it back to the elevator and takes it to the third floor. The hallway is identical to that of the floor below, except that now Danny enters a door labeled "A. J. Marx Garment Company." The receptionist announces his arrival.

The Marx Garment Company

"This office," Danny begins, "is the headquarters for a large company that manufactures women's and children's clothing. They actually make the clothes in a factory just outside town. But they handle all their business here.

"There are people here with jobs like those we saw downstairs. The first person we met was the receptionist. There are secretaries, typists, file clerks, maybe even a lawyer lurking around here somewhere. But you'll find some new occupations here, too.

"This woman with the corduroy suit is Lois Terlizzi, *chief purchasing agent.* She's in charge of the purchasing department, which is especially busy these days. The company is getting ready to produce its new fashions for spring. The designers have finished drawing patterns and choosing fabrics. Now the purchasing agents must buy the fabrics.

Purchasing agents work under pressure almost all the time.

"Lois' staff has frantically phoned and visited fabric suppliers, inspected their fabrics, and written reports. With all that "legwork" completed, Lois knows what's available. Now she and her staff will decide what and how much to buy. To do that, they have to know how much fabric is used for each garment and how many garments will be produced. Then, in another flurry of phone calls and visits to suppliers, they hunt down bargains and buy, buy, buy!

"Now, this man in the tan three-piece suit is the advertising manager. He never buys my food, but I know all about him. Name's John Vorhes. John and his staff plan the advertising campaign for the spring fashions. They decide how much to spend on ads and how to spend it. Then they create the ads. Sometimes they do the writing and artwork themselves. But for a big campaign like this, they'll call in an advertising agency.

"John's people depend heavily on the work of this woman in the green skirt, Ann Karras. She's a *market researcher.* It's her job to find out who buys Marx clothes and why. Her staff conducts surveys to find out what the

Lawyers complete 3 years of law school after graduating from college.

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Advances come so rapidly in the computer field that it's essential to take courses to keep your skills up to date.

public wants. Their information helps John's advertising workers aim their ads at the consumers most likely to buy from Marx. Ann's work also helps the designers know what designs will be most popular.

"Of course, you may be offering the best clothes in the world, and have the customers lined up at the store with their money in hand. But you won't sell a stitch if you can't move it from the factory to the store. That's the job of this lanky lad with the pencil on his ear, Ray Clark, the Marx Company's *industrial traffic manager*. Ray knows the shipping regulations and rates. He figures out the cheapest, most efficient way to ship clothes all over the country.

"And you can't run a business unless you can keep track of your money, believe me. That job goes to the accounting department. Maria Fernandez, the lady with the wire-rimmed glasses, is one of their *accountants*. She manages Marx's taxes. She keeps records of how much the company spends and each year she fills out its tax return. Others in her department make decisions about how to spend money and expand the company."

Danny continues chatting until it's time to move on, then packs up and rolls the cart to the elevator again. On the fourth floor, the final stop, he enters the offices of Computer Resources, Inc., otherwise known as CRI.

Computer Resources, Inc.

Danny parks his cart again and begins to talk as people gather around him.

"The work in this office all revolves around one machine, the computer. CRI has fantastic computers that can store billions of little bits of information and do thousands of calculations at lightning speed. These computers are used to do work for other businesses. The bank we visited uses CRI's computers to keep track of savings accounts, while the insurance company uses them to store and process statistics.

"Not all computers are alike. There are many kinds, designed to handle different kinds and amounts of work. CRI has a variety of equipment to choose from. So when a company wants to use CRI's services, the first step is to design a system. This woman in the brown sweater, Leila Kermani, handles that responsibility. She's a *systems analyst*. She knows which computers can do what, and she finds out all she can about the work to be done. In this way she can design the best system for the job.

"After Leila has designed the system, a *programmer* takes over. Vince Scaglia, the man in the plaid tie, is one. He knows the languages, or special number codes, that

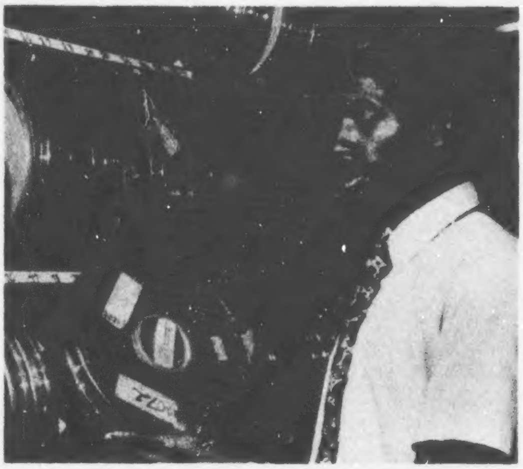
Computer programmers need imagination to find new ways to solve problems.

are used to tell a computer what to do. He writes the program, a detailed, step-by-step set of instructions in the appropriate language. Maybe you know that a computer can't actually think the way a human brain can. So when it finds an error in the program, it can't figure out what the programmer meant. Vince takes great care in writing programs, and even so he expects to spend lots of time working out the "bugs."

"Once Vince has written the program, it has to be fed into the computer. Now, a computer can't read handwriting from a piece of paper the way we can. But it can "read" holes punched in a card or information recorded on magnetic disks or tape. So the program and the numbers it will operate on—known as data—must be put onto cards, disks, or tape. That job belongs to Tony Klein, that redheaded fellow, or one of the other *key entry operators*. Tony is a lot like a typist because the machines he uses have typewriter keyboards.

"There are other people who actually run the computer. Mary Mitchell, that woman with the green jacket, is a *console operator*. She feeds in the program and data, runs the equipment, and tries to find the source of any problem that occurs. The man next to her, Matt Janicki, is a *high-speed printer operator*. He runs a machine that prints out the results of the program so fast it takes your breath away.

"You know, this office has over 50 workers. It always amazes me that it takes so many trained, intelligent people to operate a machine. But that's how complex computers can be. And they're used every day, everywhere, for almost everything!"



Keeping track of all the tapes at a university computer center is this tape librarian's job.

This inventory clerk is using a desk-top terminal linked to a computer several miles away.

When the last wave of hungry workers has passed by, Danny packs up the cart once more. A short elevator ride later, he is back on the street. "Now you see what I mean," he reflects. "You find so many different occupations in these offices. I pointed out a couple of dozen, but there are many more in this building, not to mention the other high-rises all along the street.

"All these people work in clean, well-lighted offices. Most of them have desks. And most of them work a normal 9-to-5, Monday-through-Friday week. But the similarity ends there. Some office occupations require creativity, while others are routine. Some are for high school students, others for Ph. D's. Some work with numbers, others deal in words. Some involve nonstop contact with the public, others involve none at all. There's so much variety . . . take your pick!"

Danny pauses for a moment, scratches his head, then reaches into his cart and pulls out two square items wrapped in paper. "All that talking made me forget how hungry I am! Here, have a cheese sandwich, on the house!"

Employers prefer high school or business school graduates for jobs as office machine operators.

Cashier training is offered in many high school distributive education programs.

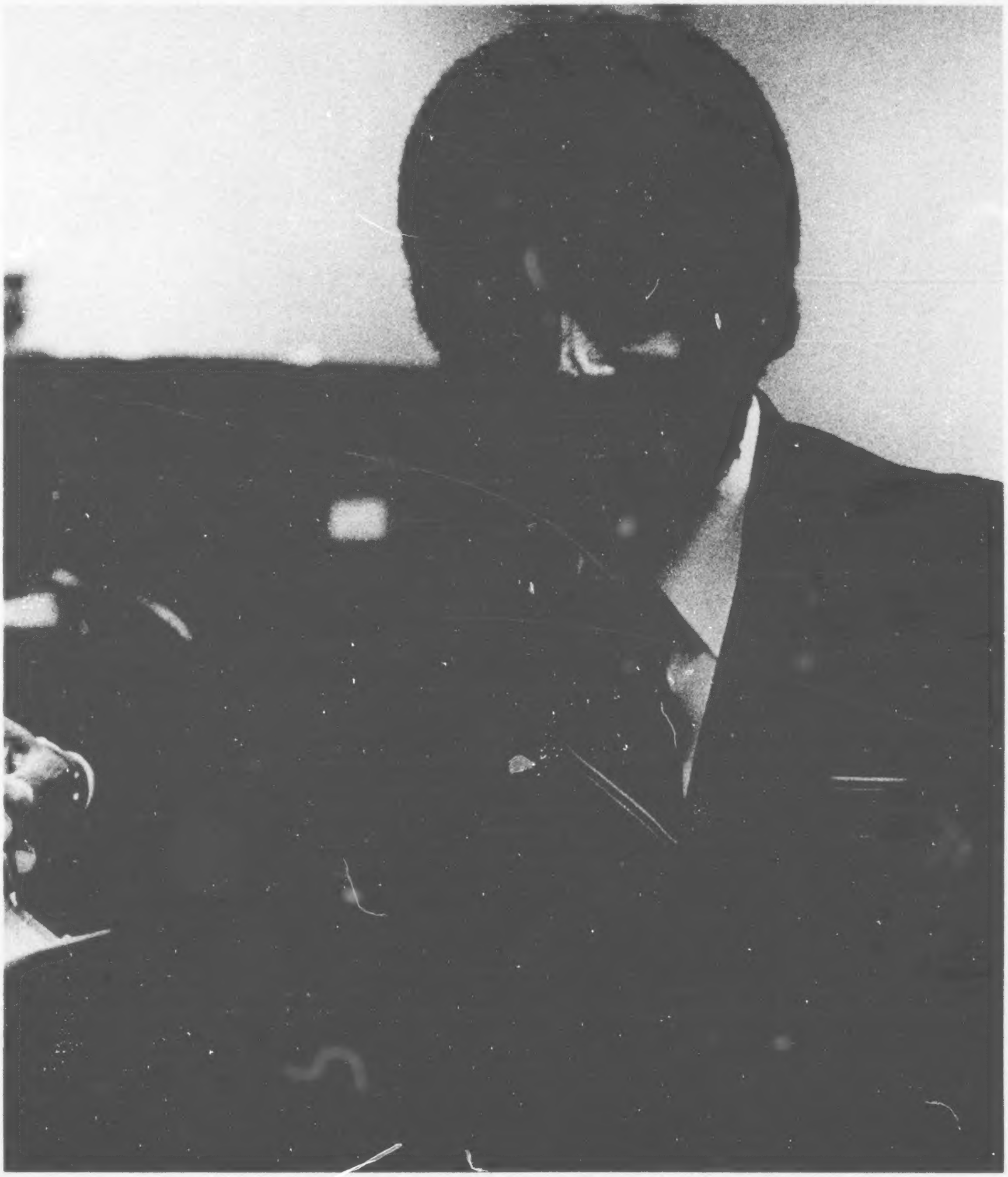
Training

There's a lot of variety in office occupations, as Danny says. And the training you would need for these occupations varies almost as much. If you want to be a bank teller, for example, high school is all the preparation you really need before you begin. The bank will train you to do what tellers do. But to become a lawyer, to take another example, you must do much more. After finishing high school, you attend college for 4 years, then spend 3 years in law school. And when you graduate from law school, you face another hurdle. Before you may practice law, you must pass a long, difficult test called a bar examination. Not every office occupation, of course, requires so much preparation. The training requirements for each are given in the Job Facts at the end of this chapter.

You don't have to go to college to enter the world of office work. Many high schools have business education courses. These courses teach you skills that are useful in office occupations, including typing, shorthand, bookkeeping, accounting, business economics, and office procedures. Some high schools have courses that teach you how to use a computer.

Many high schools allow you to work part time at a related job while you study. The job gives you a chance to practice your training and gain experience in the working world. In addition, many schools have a chapter of Future Business Leaders of America or Junior Achievement. These organizations work with the schools and the business community to sponsor local and national activities that are both fun and educational for students in business education. The activities include contests, community service projects, and model or actual businesses. A high school counselor or business education teacher can give you information about activities in your area.

Bank Officer



Bill Hooker is an assistant cashier for the Commerce National Bank.

"I joined the bank right after receiving my bachelor's degree in economics."

The telephone on the desk rang twice. A tall man in a three-piece suit punched the lighted button and picked up the receiver before the third ring escaped.

"Good morning, Commerce National Bank. William Hooker speaking."

"Hi, Bill. How's the bank's busiest assistant cashier?" asked a voice at the other end of the line.

"Fine, Liz, but you're right, I'm awfully busy. Can we meet for lunch at noon? I should eat at my desk today, but I can't stand Danny's lunchwagon specials 3 days in a row."

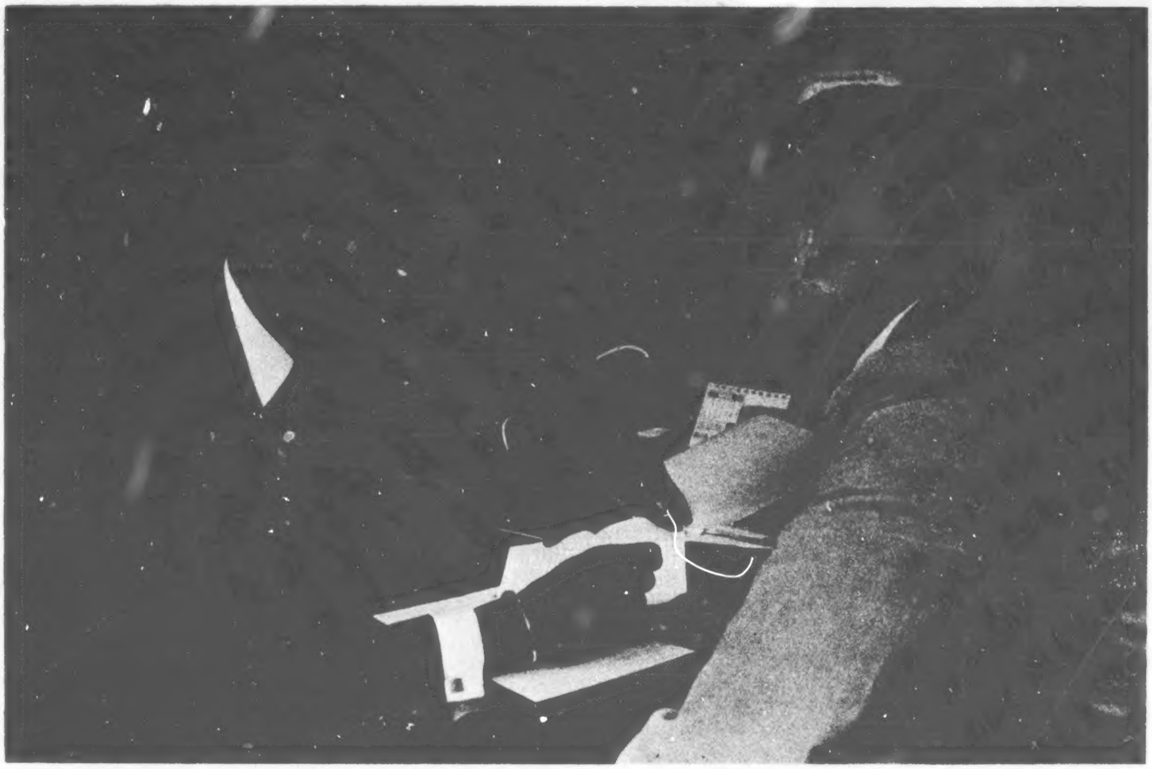
"No problem," answered Liz. "We'll get a quick bite down the street. I'll come by at 12. See you then."

Bill put the receiver down and sighed as he looked at the pile of work before him. Sometimes it was too much for him—and Bill certainly wasn't afraid of hard work! Thinking back over the 3 years he had spent with the Commerce National Bank, Bill could remember quite a few times when he had worked long into the night. He had joined the bank right after receiving his bachelor's degree in economics. During his first year at the bank, he was a trainee. He became familiar with the many different kinds of business that Commerce National handled by spending a few months "learning the ropes" in each of the bank's divisions. He worked in commercial lending first and then transferred to checking. After that he worked in the international division. After a year he knew the bank as well as some of the more experienced officers.

During the time he worked as a trainee, Bill decided that consumer lending interested him most. A job was available in that division, and Bill spent the next 9 months lending people money for new cars, home improvements, vacations, college tuition, and other personal needs. Then he was promoted to the job of assistant cashier. He was expected to handle any problems or business that customers brought to him. If he couldn't take care of them himself, he had to know who could. His performance never slackened, but still there were days like this one, when the mountain of work just continued to grow.

As he was about to dig into that mountain, Bill noticed a middle-aged couple approaching his desk. "May I help you?" he asked, smiling.

"I think so," answered the man. 'My name is Joseph Lupovich, and this is my wife Margaret. We'd like to borrow some money to buy a new car."



Bill is expected to handle any financial problems that the bank's customers may have.

"Well, I can certainly help you with that. Please have a seat, Mr. and Mrs. Lupovich," said Bill, indicating the chairs next to his desk. "Now, how much did you want to borrow?"

"We found a car that costs $5,500. We have $2,000 in savings that we can spare, and the dealer will give us $500 for our old car. So we need $3,000 more," said Mrs. Lupovich.

"Does the $5,500 include State and local taxes, license, and extra insurance costs?" asked Bill.

"No, we'd forgotten about those."

"Well, they will bring the cost of the car to around $6,000. So you'll need about $3,500. No problem so far," said Bill. "Now, if you'll fill out this two-page loan application form, we'll be able to evaluate your request."

Bill handed Mrs. Lupovich the standard form used at Commerce. Together, the couple began filling it out. They wrote down their names and address, where each one worked and how much each earned. They also gave information about their savings, checking, and charge accounts, as well as previous loans they had received. When they were finished, they handed the form back to Bill, who looked it over.

"Now, let's see. Together, you earn about $30,000 a year. You have one child. The mortgage, taxes, and insurance on your house cost you about $350 a month, and you don't owe very much on your charge account.

"On our new car loans we charge interest at an annual rate of 9 percent and the loan must be repaid in 3 years. So besides the original $3,500, you'll owe us another $516 for interest. That's the "cost" of the loan. If you take the entire 3 years to pay us back, you'll pay about $111 a month. I should think you'd have no trouble with that."

"So what do we do now, Mr. Hooker?" asked Mrs. Lupovich.

"Nothing, until we call you back. We'll simply check to see that everything you wrote here is in order, and then you'll receive your loan. Since you have a checking account with us, I can look at our records myself to make sure you maintain the account properly. Your savings and charge accounts and your mortgage are all with other banks, however. To check on those, I'll give your application to our credit investigator. She will call the central credit bureau for your credit history. She'll also call your employer to verify your income. This will all take a few days; then you can come in to sign the papers and receive your money.

"There's one other thing. On most consumer loans, your signatures are the only assurance we need that you will pay us back. These are called "unsecured loans." For a new car, however, we ask that you sign an agreement called a "chattel mortgage." It says that if you fail to pay us, we can take the car as payment. Now, we have faith that you will pay us on time, of course. This is just a precaution."

"I understand," replied Mr. Lupovich. Mrs. Lupovich nodded in agreement. "Then we'll hear from you shortly?"

"Right, and thank you for coming in!" said Bill, wishing them a pleasant day.

"Back to the mountain of paperwork," he muttered to himself after the couple left. "And now it's even higher!" But he really didn't mind. He spent almost half of each workday talking with customers and enjoyed that part of the job very much. In fact, now that he thought about it, helping people like Joseph and Margaret Lupovich gave him more pleasure than any other aspect of his work. Bill hoped their credit history was in order. They seemed nice, and Bill wanted them to have their new car. Usually everything checked out properly, but not always....

Bill picked up some papers from his desk and looked through them. Here's a request I'll have to turn down, he thought. A man wanted to buy a boat for $20,000. He had $3,900 and wanted to borrow the rest. Normally the bank would ask him to pay at least $5,000 himself, but he had a checking account and another loan with them. So Bill thought he could bend the rules. But he found that several of the man's checks had "bounced" (had been returned because he had too little in the account to cover them). And some of his loan payments were late.

"Helping customers gives me more pleasure than any other aspect of my work."

Bill knew he couldn't lend the man more money; he was unreliable. Bill disliked this part of his job—telling someone he couldn't approve a loan they wanted—but it had to be done. The whole purpose of investigating a person's credit history was to weed out these "bad risks."

Much of the work on Bill's desk involved consumer loans: Evaluating an application for approval or rejection; looking at the bank's records; having the credit investigator check someone's credit history; calling the customer and saying the loan was approved; or having the secretary type up papers for the customer to sign. For loans of more than $3,500, he also had to consult his supervisor. (As he gained experience with the bank, his "assigned lending authority"—the amount he could lend on his own judgment—would increase).

He did other things, too, and some of them had nothing to do with loans. Yesterday, a man who was not a Commerce customer wanted to cash a check from a different bank. The teller asked Bill to approve the check. The day before, a woman who had just moved to town came in to open a savings account. Bill filled out a form, deposited her money, and gave her a passbook.

A regular customer, planning a long vacation in France, came in first thing this morning to ask how he should carry his spending money. Bill advised him that travelers' checks were much safer than cash. "You sign the checks once now and again when you spend them," he explained. "If they get lost or stolen, they are no good to anyone else, so the bank can pay you back for them. But if your cash is lost or stolen, it's next to impossible to recover it."

As Bill was examining a loan application, the mail clerk dropped a batch of letters in his "In" box. He immediately noticed the letter on top of the pile. It was on thin airmail stationery and had Japanese postage stamps. The letter came from Russell Anderson, an American businessman who had been sent to Tokyo for 6 months. In his letter, he asked Bill to transfer $500 from his Commerce account to a Toyko bank. Bill laid the letter aside and made a mental note to take care of it as soon as he finished reading this loan application.

Exploring

Bank officers must show their best side to customers.

- Do you like meeting and talking with people?
- Do you enjoy getting to know strangers?
- Are you comfortable talking with strangers on the telephone?
- Can you remain friendly and courteous, even with irritating people or when something is troubling you?

Bank officers must know how to "read" people as well as financial records when judging a request for a loan.

- Are you a good judge of character?
- Can you tell when a friend has made up a supposedly "true" story?
- Do you question things you read or hear that don't seem right?

Bank officers deal with large sums of money and with information about people's private lives. They must be honest and trustworthy.

- Are you careful with another person's belongings and with valuables?
- Are you careful with money?
- If you receive an allowance, do you spend it wisely?
- Do people trust you?
- Can you keep a secret even though you want to tell someone?

Bank officers are part of a team. They must be able to get along with their co-workers.

- Do you enjoy working with others in group projects?
- Do you like team sports?
- Are you willing to follow another person's instructions?

Bank officers work with detailed financial statements, which they must read and write very carefully.

- Do you enjoy working with numbers?
- Are you good at math?
- Do you check your homework before handing it in?
- Are you an organized person?

Bank officers often have to refuse loans, even to customers they would like to help.

- Do you know how to say no?
- Do you keep people from taking advantage of you?
- Can you stand firm with your younger brothers and sisters, even if they beg or cry?

Suggested Activities

Arrange a class tour of a large bank. Talk to employees in several different departments. Find out how they started in banking, what they do, and how they fit into

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the total operation. Make a list of the different kinds of officers in the bank.

Invite officers from two or three departments of a bank to visit your class and present a panel discussion. Ask them to describe the work they do and the training they needed to get their jobs. Prepare questions for the panelists.

Serve as treasurer of a club or other organization. Volunteer to help collect and count money for a school event. This will give you experience handling money. By keeping a careful record of all the money received and spent, you can also learn something of bookkeeping.

Role-play a meeting between a loan officer and customer requesting an auto loan. Plan the roles ahead of time: How much money is requested and for how long? What is the borrower's financial situation? What questions does the loan officer ask? Use a loan application from your local bank.

As a topic for a report in your English, social studies, or mathematics class, investigate the difference between a bank and a savings and loan association. You might start by talking to an official of each. In your report, try to answer these questions: What do banks have in common with savings and loan associations? What services does each offer that the other does not? What laws apply to each? What occupations are found in one, but not the other?

When people think of money, they usually think of cash—coins and bills. In fact, most of the "money" in circulation in the United States is not in the form of cash, but in the form of approximately 25 billion checks written each year. Use checking as a topic for a report in your English, social studies, or mathematics class. Talk to your parents, your school or public librarian, and the officers of a local bank to find answers to these questions: How do you use a checking account? What happens to the check after it is written? (Make a diagram to illustrate this.) What happens if a check "bounces?" What kinds of bank occupations are connected with checking accounts? Report the results of your investigation to your class.

What does "interest" mean to a banker? In the story you read, Bill explained to Mr. and Mrs. Lupovich that interest is the cost of borrowing money from the bank. But if they had a savings account, the bank would pay them interest for keeping their money there. Interest, quite simply, is the price someone (a person or a bank) pays for using another's money.

Use the topic of interest and interest rates for a report to your English, social studies, or mathematics class. Answer the following questions: What interest rates do banks in your area set for loans? Why do they charge different rates for different kinds of loans? What interest rates do they set on different kinds of savings accounts? How do banks' rates compare with those of savings and loan associations?

Interview one of the officers at your local bank to find out how a 24-hour teller works. Ask whether the bank needed fewer people to work as tellers after the machine was installed. Report to the class, bringing with you examples of the different kinds of forms needed to conduct transactions with an automatic teller.

Have you ever looked closely at a dollar bill? Notice the words above George Washington's picture: Federal Reserve Note. They refer to the Federal Reserve System, or "Fed", which regulates the amount of money in circulation in the United States. Use the history of money as a topic for an individual or group report in your English, social studies, or mathematics class. Answer the following questions: When and how did our national currency come to be? How has it changed over the years? What gives paper and coin money its value? When and why was the Fed created? How is it run? Who is its current leader? How does it regulate the amount of money in use?

Join a Banking or Finance Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for information on careers in banking to the Bank Personnel Division, American Bankers Association, 1120 Connecticut Avenue, N.W., Washington, D.C. 20036.

Related Ocupations

Bank officers are one of many kinds of workers who do detailed financial work. Several others are listed below, along with possible descriptions of what they do. For each occupation, see if you can choose the correct description.

1. **Accountant**
   a. Prepares financial reports and tax returns for businesses or individuals.

b. Opens new checking and savings accounts for customers at a bank.
c. Counts freshly printed dollar bills at the U.S. Bureau of Engraving and Printing to be sure how many were made.

2. **Appraiser**

a. Gives final approval to all requests by businesses for bank loans.
b. Keeps track of bank employees' work and tells them when they are doing a good job.
c. Determines the value of land and buildings for tax purposes.

3. **Auditor**

a. Listens to the explanations of people who can't pay their bills on time.
b. Inspects a company's records and reports on its financial situation.
c. Tracks down people who write phony checks.

4. **Broker**

a. Gives advice to people who have run out of money.
b. Sells automobile insurance.
c. Buys and sells stocks for people and businesses.

Bill collectors need to be pleasant but firm when they try to get people to make good on unpaid bills.

Top jobs in banking require years of experience.

5. **Credit analyst**

a. Checks up on newly hired bank tellers to make sure they can be trusted.
b. Looks at the financial situations of people and businesses to see if they should receive credit.
c. Helps people decide what credit cards to get.

6. **Revenue agent**

a. Helps protect the gold at Fort Knox.
b. Investigates cases of counterfeiting (printing phony money) for the FBI.
c. Checks up on tax returns to make sure people and businesses are paying their taxes.

7. **Treasurer**

a. Keeps track of how much cash a bank has each hour of the day.
b. Directs the use of a company's money.
c. Tells the President how much money is in the U.S. Treasury.

8. **Underwriter**

a. Approves or denies a person's request for life insurance.
b. Keeps a company's checkbook and signs all its checks.
c. Helps a company find the best way to make money.

See answers at end of chapter.

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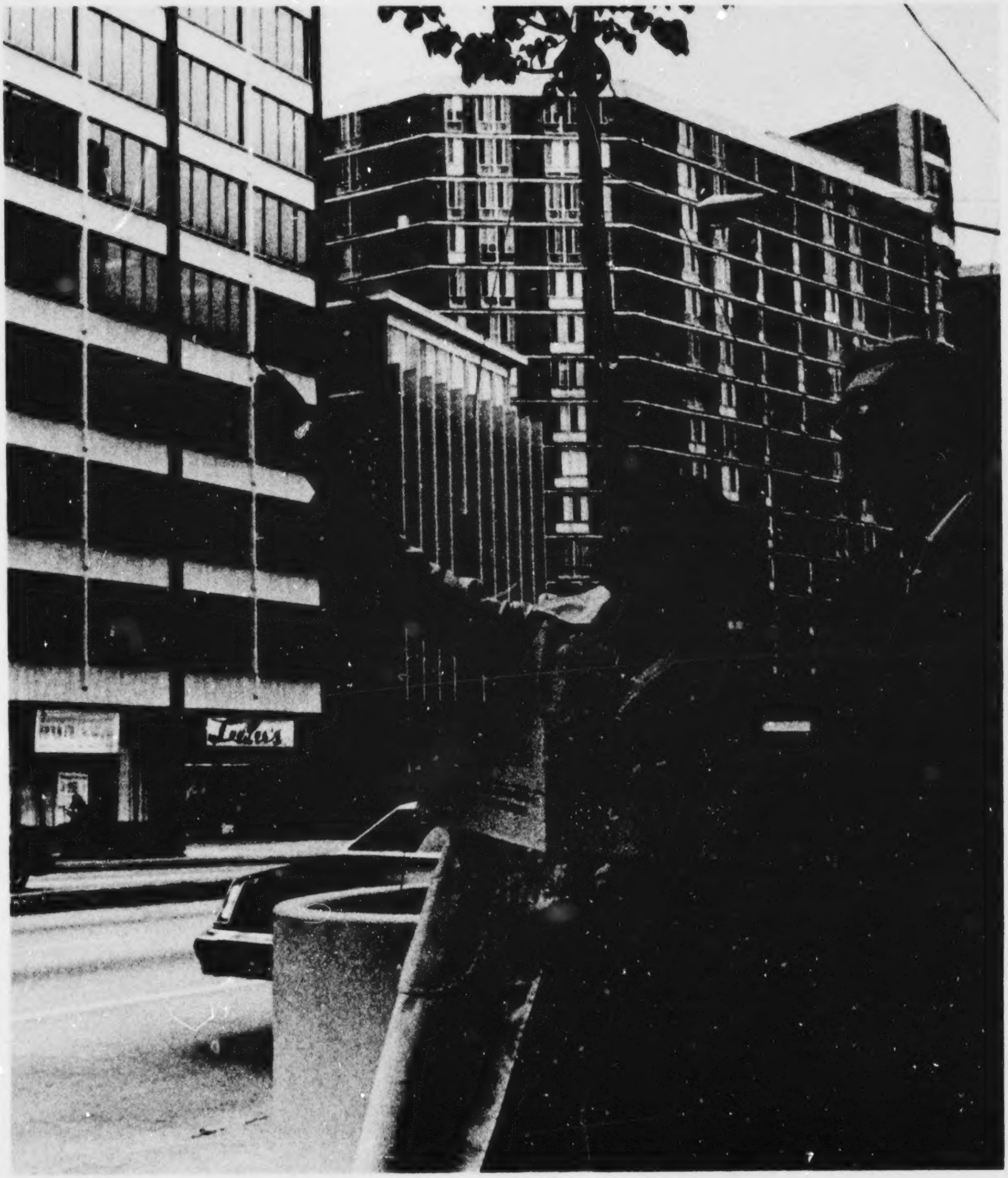
Planner



As a planner, Lyn wears many hats. "In one day I may talk with a transportation engineer, a lawyer, and an architect."

A community is a living thing. It wakes and sleeps, uses energy and produces waste, just as you do. Its "nerves" carry information while its "arteries" carry traffic through its system. The people who live and work in a community are its blood. Without them, it cannot live.

Like other living things, communities grow and change. Farmland gives way to towns. Towns push outward and become cities. Forests are cleared for new homes. Old brick buildings make way for steel and glass skyscrapers.

But not all parts of a community change in the same way or at the same speed. At the edge of a city, for example, you might see a rapidly growing neighborhood with wide, well-paved streets and clean, modern buildings. Closer in, you might pass through an older part of town. The trees are bigger, the buildings look a little more run down than they did 10 years ago. But nothing else has changed. And at the heart of the city, you might see a different kind of picture. The broken windows and burned-out buildings, the garbage on the sidewalks and graffiti on the walls tell you that this neighborhood is dying.

Communities grow up and grow old, just as people do. And just like people, they need care. Think of what happens to people who don't take care of themselves. They get sick or hurt more often. And they may die sooner. So, too, with a community. Without proper care it becomes run down. Eventually it turns into an unhealthy, ugly, even dangerous place to live.

Who takes care of a community? Many people do in different ways. The police and fire departments protect it from crime and fire. A council makes laws. The mayor guides the community on its day-to-day course. But who sits in the lookout tower? Who keeps track of how the community is changing? Who watches to see that in 10 years it will be the kind of home its residents want?

That job belongs to the planners.

Planners help a community make decisions that will affect its future health. For example:

- Should a factory be built to provide jobs for local residents, even if it will pollute the water they drink?
- Should a county keep its farmland or allow houses to be built on it?
- Should a city tear down houses to make room for a new highway or office building?
- Should the electric company clear a forest to build a new power plant?

Citizens and government bodies face such decisions all the time. But they can't decide what's best for everyone without information. They must know all the effects—good and bad—that each choice would cause. Planners provide that information.

What is it like being a planner? "It's a balancing act," says Lyn Coleman. "On one side, private citizens want to use their land as they please. On the other side, the public wants the land used in a way that will benefit the whole community. The planner has to balance these two sides."

Lyn knows this as well as anyone. As a planner for Montgomery County, Maryland, she performs this balancing act every working day. Right now, for example, she is working on a new "master plan" for the area around the town of Olney. A master plan is a blueprint for the future. It shows how each piece of land should be used, whether for heavy industry, commercial business, single-family homes, farms, recreation, or some other purpose. In this way, a plan guides the growth of the community.

"A master plan is only good for 5 or 10 years," explains Lyn. "Then it becomes outdated." The last Olney plan was written in 1969. Now, like a child outgrowing clothes, Olney has outgrown its old plan and needs a new one.

Lyn and an urban designer, John Carter, are given the job, which will take about a year. They could finish it pretty quickly if they stayed in the office all day long. But if they did that—using just their own ideas and not getting anyone else's—they'd be taking a big chance. Like a person selling refrigerators at the North Pole, they'd soon find that nobody wanted their product. It would simply gather dust on a shelf.

Lyn knows how important it is to be in touch with local citizens from the start. At a public meeting in Olney one evening, she talks to citizens and sets up an advisory committee. The committee will see to it that the people of Olney understand how the master plan will affect their everyday lives. The committee also will advise Lyn and tell her what the citizens want.

After setting up the committee, Lyn returns to research. She must have the answers to a long list of questions about the Olney area before she can begin writing the plan. Part of her list looks like this.

Questions about the natural features of the area:

- What types of soils are found in the area, and where?
- Where are the hills and valleys?
- Where are the waterways? How clean are they?
- In which directions does rainwater run off the land?

Questions about people:

- How many people live there? Where do they live?

- How many children are there? How many older people?
- What about income? Is there a mixture of people with different income levels?
- What kind of business is there?
- How has the population grown over the years?

Questions about land use:

- How is each piece of land used today?
- For what use did the old plan intend it?
- Where are the important historical sites?

Questions about transportation:

- Where are the roads and railroads?
- How much traffic travels on them?
- Where do traffic jams take place?

The answers to these questions come from many places. To find out how the land is being used, Lyn and John study aerial pictures. Then they drive and walk around the neighborhoods to get a closer look. To answer other questions, Lyn relies on studies done by other divisions of the planning staff, other county agencies, and the Federal Government. She also gets useful tips from citizens.

And speaking of the citizens, Lyn's next step takes her back to them. In a series of public meetings, she again tries to get a sense of what the people want for their community. How would they like to see it grow? What kinds of changes are important to them? What things do they *not* want to change? Lyn knows there are almost as many answers to these questions as there are people in Olney. That's why the planners hold several meetings. They talk to farmers at one, land developers at a second, citizens of the town at a third.

And this is just the beginning. During the whole time the plan is being written (and even after that) there will be public meetings. Every time a Chamber of Commerce or a PTA, neighborhood association, or other civic group asks a planner to come and speak, Lyn (or one of her co-workers) will take the colored maps and go. She tells citizen groups what the planning staff has in mind for Olney. She also listens to suggestions and complaints.

Once she has a good idea of what the people want, Lyn starts writing. "As a planner, you must know how to write well. The citizens will read your plan, so you have to keep it clear and simple."

And with the writing begins the balancing act. Lyn brings together all she knows about what the citizens want, what the community as a whole needs and wants, what has already been done, and what makes good sense. Bit by bit, piece by piece, she figures out how to use the land in a way that is best for everyone.

"Planning is an art, not a science."

If that seems easy, think again. "Planning is an art, not a science," Lyn points out. "There's no formula you can use to answer a question or solve a problem, because every one is different. There are only basic principles of good planning. The rest is creativity, hard work, and common sense. But that's what makes the job challenging and fun."

Lyn draws on the knowledge and expertise of other people on the county planning staff. There are several divisions, and each specializes in something different. One division puts together information on soil, terrain, water, air quality, and other environmental matters. Another covers architectural and engineering problems. There are divisions for parks and recreation, for housing, and for transportation. And a research division gives advice on population characteristics and market trends. The experts in these other divisions help Lyn solve the many problems that come up as she writes the plan. "The Olney plan is a team effort," she explains, "and I'm the team leader. I put it all together."

Working with people in so many different fields gives Lyn's job a lot of variety. "A planner wears many hats," she says. "In one day I may talk with a transportation engineer, a lawyer, and an architect. To speak each one's language, I must know a little about engineering, law, and architecture. Planning is an occupation for someone with many different interests."

Lyn has her own specialty: Rural and agricultural planning. "Most people think of planning as only for cities," she explains. "And it's true that planning started there. But the cities have grown so quickly that the farms and small towns are disappearing. Now planners are trying to preserve them, too."

Lyn's own interest in planning also started with cities. As the daughter of an Air Force officer, she traveled widely in the United States and Europe when she was growing up. "I saw many cities," she recalls, "and I noticed some were nicer than others. I began to wonder why."

Lyn learned more about cities in college. Majoring in political science, she studied urban politics. With her bachelor's degree she got a job as a research assistant in a planning office. "I thought I could work my way up. But I just couldn't pick up what I needed to know."

So Lyn went back to college for 2 more years to earn a master's degree in urban planning. Taking courses in many different departments, she learned a little about everything. "Because planning is so broad, there wasn't time to specialize in school. For me, specialization came in my job. The main thing we learned in school was how to think about and solve problems."

The Olney master plan promises to be a major step for Lyn in developing a specialty as a planner. Olney is a small suburban community surrounded by farms. The town has grown very quickly in the last few years, eating up the farmland. With the new plan, Lyn hopes to slow the town's growth and save the rural area.

One way this might be done is with a rule requiring every new home to have at least 5 acres of land. In most neighborhoods in a city or town, each home has half an acre of land or less. With a 5-acre rule, there would still be lots of open space.

But every rule makes someone unhappy. In this case it might be a couple who bought 20 acres of that land years ago. They expected the town to expand and they hoped the land would become very valuable. They hoped to sell it for a great deal of money to a developer who would build 40 or 50 new homes on it. But the 5-acre rule would allow only four new homes, making the land much less valuable. The couple could lose thousands of dollars.

When Lyn has to face that couple, the balancing act becomes really tough. "They're almost in tears because this part of the plan will ruin them. And I have to explain why it's necessary. This is the hardest part of my job."

It is also a large part of her job. Many people come in to ask about the new plan (though not all of them are as upset as that couple). Others call or write for information. Lyn talks or writes to each one of them, which takes a great deal of time.

The phone calls, letters, and visits continue while Lyn writes the Olney plan. Do they stop when she has finished? Not at all! In fact, they increase, because the plan she has produced is not a final version. It is only a "sketch plan." After it is published, the people of Olney

"Most people think of planning as only for cities. But cities have grown so quickly that farms and small towns are disappearing. Now planners try to preserve them, too."

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have a chance to read it and react to it. For Lyn, this means more phone calls, letters, and visits. It also means more public meetings with the colored maps.

Lyn points out how important this part of her work is. "You have to be quick on your feet. Public speaking ability is essential! After all, as a planner, you're telling people how to use their land. You have to expect opposition. But you also have to convince the people that your plan makes good sense. It won't sell itself."

Lyn enjoys dealing with the public. "Average citizens have become aware of the need for long-range planning. I'm glad to see that, and I like working with them."

Based on the public's reactions, the staff members make changes in the sketch plan. Then they give the new version to the five-person planning board. After the planning board approves the plan, it goes to the County Council, which makes laws for the county, for adoption as official county policy.

And still Lyn's work is not finished! After all, what good is a master plan that stays on paper? It must be put into effect. How? Through zoning regulations. Each piece of land in the county belongs to a zone. And in each kind of zone, only certain types of buildings may be legally built. Let's say you wanted to build a shopping center on land that was zoned for single-family homes. Before you could build, you would have to get the County Council to "rezone" the land (change its zoning) for commercial business.

To put the new plan into effect, much of the Olney area must be rezoned. That means many County Council sessions and public meetings. And as the plan's author, Lyn must be there to explain it. The meetings continue until rezoning is finished and the new plan takes effect.

And where does that leave Lyn?

With other projects to do. With more letters to answer. With more phone calls to return. With more people to speak to.

And with the satisfaction of knowing she's helped improve her environment.

"And that," she says, "is the best part."

Exploring

Planners figure out the long-range effects of building something new—a highway or housing project, for example. To do so, they must think ahead.

- Do you save money for things you can't buy right away?
- Do you enjoy games of strategy, such as checkers, chess, or bridge?
- Do you plan your weekends and vacations in advance?
- Do you daydream about your future?

Planners must have a talent for design and for arranging space.

- Do you like to design and sketch airplanes, buildings, clothes, or automobiles?
- Have you built a model railroad layout or a miniature town?
- Do you sometimes rearrange the furniture in your bedroom?
- Have you ever designed a garden?
- Can you give directions by drawing a map?
- If asked to clean a cluttered closet or garage, do you reorganize the things in it?

Because they deal with many different aspects of community life, planners must know about and be interested in many subjects.

- Do you read books on many different subjects?
- Do you watch a variety of TV programs?
- Do you have more than one hobby, or play several sports?

Planners are concerned about the environment around them.

- Do you react to changes in your neighborhood, such as a new street or building?
- Does it bother you to find garbage in a park or lake?
- Do you participate in local recycling drives?

Planners deal with many different people, including professionals in other fields and the general public.

- Do you enjoy working on group projects?
- Do you get along with most of your classmates?
- Do you like playing team sports?
- Can you listen with interest to another person's point of view?
- Can you convince a group to go along with your ideas?

Planners make plans that take a long time to fulfill and sometimes never take effect.

- Do you enjoy projects that take a long time to complete, such as growing vegetables or putting on a play?

- If you are taking music or dance lessons, do you practice faithfully?
- Do you keep trying if things don't turn out just the way you wanted?

Suggested Activities

As a project for your social studies or government class, find out if your city or town has a planning department. (If not, your county or a nearby town might). Invite one of the planners to speak to your class. Prepare questions beforehand about the process of planning and the work of planners. Be sure to find out what other parts of your local government are involved in the planning process.

As a topic for a report in your history, social studies, or government class, investigate the history of the area in which you live. Try to answer the following questions with your research: When was your city or town founded? Was there a special reason for its location? How did it grow to its present form? If your community is now planned, when and why did planning begin? The library and the local government should be able to help you find the information you need.

Use zoning as a topic for a report in your social studies or government class. You might go to a hearing before the local zoning authority as part of your research. In your report, try to answer these questions: How many different kinds of zones exist? What are some of them? What restrictions does the community set on height and spacing of buildings? Who makes zoning decisions? How can zones be changed? What role can the public play in making zoning decisions?

Using what you've learned about zoning in the preceding exercise, role-play a situation in which a developer wants to build a shopping center on land zoned for single-family homes. Students should work out and play the roles of the developer, merchants who want to open stores in the shopping center, the zoning authority, neighborhood residents opposed to the project, planners, and any others who come to mind.

As a project for your social studies or art class, design a park or playground for a vacant lot or field in your neighborhood. Make a scale drawing of your design, showing where you would place lawn, trees, pavement, playing fields, equipment, and buildings.

Have a panel discussion in your social studies class on a new project proposed for your area, such as a new shopping center, a dam, or a recreational area. (If no suitable project exists, your teacher can suggest an imaginary one). The discussion should center on these questions: How will the project benefit the community? How will it hurt? Are the benefits worth the cost? What changes in the project would you suggest to make it more beneficial?

Put together a group report in your science or social studies class on air and water pollution in your community, dealing with these questions: How bad is the pollution? How is it measured? What are the major sources? What is being done about it? Talk to people with different interests and points of view: Government officials; public relations representatives from power companies; local industry officials; and citizen groups concerned with environmental quality. The class can be divided into smaller groups to gather information.

Join a Government or Politics Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for information on careers in planning to the American Society of Planning Officials, 1313 East 60th Street, Chicago, Illinois 60637 and to the American Institute of Planners, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Related Occupations

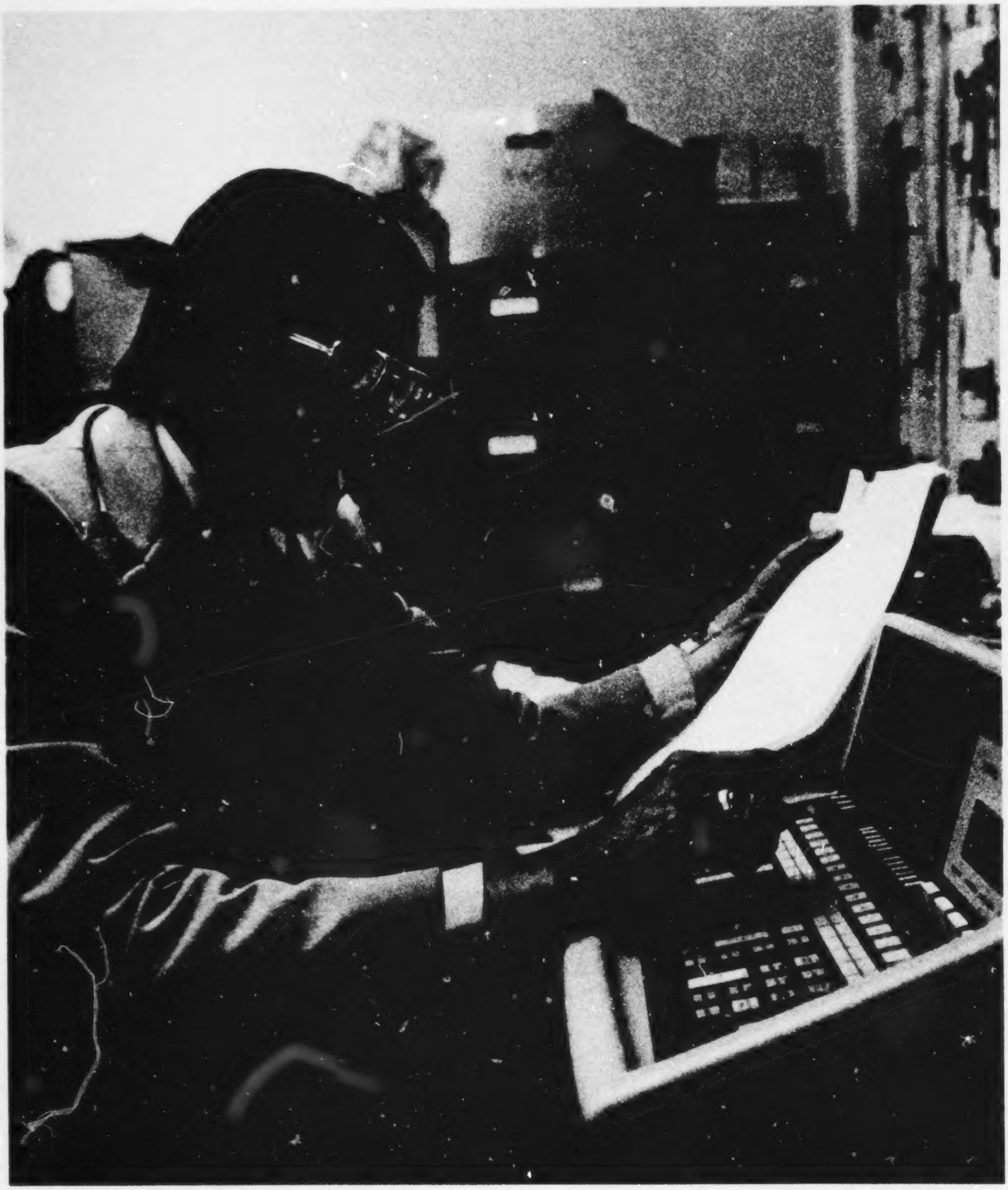
Planners aren't the only people with jobs that involve planning and design. Seven other occupations are listed below. See if you can match each item in the right-hand column with the worker who would plan or design it.

1. Architect
2. Civil engineer
3. Computer systems analyst
4. Industrial designer
5. Industrial engineer
6. Landscape architect
7. Market researcher

a. A golf course
b. A dam
c. A computer system to figure salaries and issue paychecks
d. A house
e. A survey of the breakfast cereals people eat
f. The styling and upholstery of an automobile
g. An improved production method for a chocolate factory

See answers at end of chapter.

Computer Programmer/Systems Analyst



Computers can't be kept waiting, so Joe occasionally has to work odd hours.

Joe worked his way up in the computer field. "I feel that I've done rather well for someone with no college."

Joe Jaramillo grumbled and rubbed his eyes. The clock on his nightstand read 4:08 ... *4:08 on a Sunday morning.* A phone call had awakened him moments before, and a faraway voice had told him to come down to the bank right away.

Bracing himself for the violent assault on his eyes, Joe turned on the light. "Those are the breaks," he thought. "You have to expect this sort of thing when you're a systems analyst. All my work involves computers, and computers can't be kept waiting. It's no big deal to be awakened in the middle of the night. I have to be available 24 hours a day. All part of the job."

But these thoughts made it no easier for Joe to get up at 4:08 a.m.

Shaking one foot loose from the tangle of covers, Joe planted it firmly on the floor next to the bed. The other foot followed not far behind. As he reluctantly sat up, random thoughts about his job went through the fog of his mind.

"Almost 6 years," he remembered, '6 years next week since I was promoted from programmer to programmer/systems analyst. What a change! Back then I handled the computer all the time. Writing programs, running them, finding the "bugs". And all I saw was my own little slice of the bank. Now I work with people from consumer lending, internal operations, all the different bank departments. I see the whole show. I help people understand what the computer can do for them—how it can help them do their work here. And I have lots of room to be creative.... After I find out exactly what people need, I think things through and design a new system. Then I install it and test it. But I rarely touch the computer anymore; I leave that work to the two programmers under me. If I worked in a smaller bank, I'd probably do more of my own programming...."

Joe reached over and turned on the radio. The voice of his favorite country and western singer filled his ears.

"... I've done rather well for someone with no college education! I've always liked computers, even in high school. I would have liked to learn about them in college, but I couldn't afford to go. That 6-month technical school course was the best alternative for me. It got me a job here with Commerce National Bank. Then I worked my way up the ladder. Even so, I was lucky. I got in when the getting was good. Today I'd need a bachelor's degree to be hired here...."

By now Joe's eyes had begun to adjust to the light. With a great effort he lifted himself to a standing position. Picking up his bathrobe, he somehow managed to put his arms in the proper sleeves and tie the belt around the waist. Now if he could only find the bathroom!

"... I've been on this assignment a long time," Joe's brain reminded him. "I started it 9 months ago. The head of the check-processing department, Tom Arnold, wanted a new system for processing checks. So I went over there to speak with Tom. I had to give him ideas on the possibilities and find out just what he wanted. Some people think that systems analysts are magicians, that we have a "sixth sense" that tells us what kind of system would be best. But it doesn't work that way. Unless people tell us what they're trying to do, we can't advise them how to do it.

"Tom complained that his check-processing system relied too much on people and not enough on machinery. He was afraid that the present system would not be able to keep up as the volume of checks grew. While he was at it, Tom wanted a better way of tracking down errors. And he wanted a system that would tell him who the bank's biggest customers were, how much money they maintained on deposit, and how long they kept it there. So I looked at the system he was using at the time...."

Feeling their way along the wall, Joe's hands found a switch and turned it on. Instantly the bathroom appeared around him. His left hand twisted the faucet on the sink; his right hand sprang back from the icy touch of the water. He gave it a minute to warm up.

"... Tom showed me how his department processed checks every day. The checks and deposit slips arrived in bundles. The first step was proofing and encoding. This was done by machines that took each check and printed on it the amount it was written for. The numbers were printed in a special ink that other machines could "read." Tom had 30 of these proof encoding machines in his department, and each was run by a clerk. As the checks were encoded, the operator and machine made certain that the amounts were the same as a teller's tally. This is known as "proving." Another machine, a reader-sorter, then read the specially printed number on each check and sorted and tallied the amounts of all the checks from the 30 proof encoders. It sorted the checks by the city they came from so they could be sent back to other banks and exchanged for credit. The faster this was done, the more money the banks would have available for use by their customers, loans, credit advances, and the like. Finally, the checks were photographed by a microfilm camera for future reference.

"The system was good at first, but I could see Tom's point. They'd run into problems as more and more checks came through. Tom knew what he needed and I knew what kind of equipment was available from different manufacturers, so together we created a new system. We looked at the latest equipment and considered different ways of setting it up. We had to think about how reliable each machine would be, not just how fast it could do the job. Every time something breaks down and the system stops running, the bank loses money. So reliability mattered a lot. The cost of new equipment was important, too. . . ."

The water had gotten warm. Joe rubbed his face with a wet washcloth. No reason to shave at this hour, he decided.

". . . I met with Tom every day to discuss this project, sometimes for an hour or more. With his help I finally designed the right system. We decided that the hardware produced by the National Computer Technology Company was the best for our needs. Other companies make faster equipment, but it isn't as reliable. . . ."

Back in the bedroom, Joe pulled clothes out of the closet and climbed into them. The sounds of the Beatles on the radio gave him new energy: "Woke up, fell out of bed, dragged a comb across my head. . . ."

". . . With the new system, the checks will be proofed, encoded, and automatically sorted into several categories. With the new proof machine, Tom will easily be able to get that information that he wants about certain accounts—whenever he wants it. The checks will be microfilmed while they're sorted on a high speed reader-sorter, so we will have a film record of them as the bank

"After I find out exactly what people need, I think things through and design a new computer system," says Joe.

received them. That will make it easier to track them down to find errors. And the new reader-sorter equipment will sort checks faster and will allow the bank to forward them to other banks faster than is possible now.

"When the new equipment was installed and tested, we linked it to the bank's computer. Since the two systems use different coded languages, we had to design an "interface" so that they could communicate with each other. My programmers did a great job on that.

"I'm happy with the new system. Simple, reliable, not too expensive. It was more of a challenge than that payroll system I designed last year, and I met the challenge. . . ."

Joe was dressed and ready to go. "At the tone the time will be 4:30," said the radio just before he switched it off. Grabbing his coat, he dashed out the door and prayed that his car would start.

". . . So all we have to do now is switch over to the new system. It has to be ready to process checks by tomorrow morning, when the bank opens. I thought the technicians would be able to handle the job, but obviously they've run into a problem if they need me at this hour. Well, fortunately, I don't have to make many of these night calls. If I did, I'd be a nervous wreck. It's a good thing I didn't become a firefighter. . . ."

Exploring

Programmers and systems analysts spend much of their time solving problems.

- Do you enjoy doing math problems?
- Do you like puzzles and brain teasers?
- Do you read mystery stories?

Programmers and systems analysts work with problems that are long and detailed. Solving them takes a great deal of patience.

- Do you enjoy long, detailed projects, such as doing jigsaw puzzles, painting by numbers, or building and rigging a model ship?
- Do you like to read long books?
- Do you check over your homework and tests before handing them in?

Programmers and analysts look for creative solutions to the problems given them.

- Do you enjoy solving puzzles?
- Do you play games of strategy, such as checkers or chess?
- Do you like to think of new ways of doing things around the house?
- Do you occasionally rearrange your bedroom furniture?

Programmers and systems analysts often run into very stubborn problems. If at first they don't succeed in solving a problem, they must try, try again.

- Do you keep trying when you can't solve a problem right away?
- If you play a sport or musical instrument, do you practice faithfully?
- Are you willing to rewrite an essay or redo a math problem until you get it right?

Programmers and systems analysts work with information, called data, that usually is in the form of lists of numbers.

- Are you good at remembering historical dates, batting averages, telephone numbers, bus schedules, or other numerical information?
- Do you like to memorize the amounts of ingredients in a recipe?
- Do you find it easy to use a phonebook or dictionary?

Programmers and systems analysts work closely with others. They must be able to speak and write clearly.

- Do you talk about complicated subjects with your parents, teachers, or friends?
- Can you listen to or give a detailed explanation?
- Can you give clear instructions to do a task?
- Do you find it easy to say what you mean?

Suggested Activities

Arrange for a programmer or analyst to come and speak to your mathematics or science class about his or her work. A major bank, industrial firm, or computer company is a good place to find such a person.

Present a report on computers to your mathematics or science class. Include a brief history of computers and an explanation of their main parts. A diagram would help your presentation. Also explain the differences between: Input and output; analog and digital computers; hardware and software.

Computers are an important tool in many different fields. Report to your mathematics, science, or social studies class on how they are used in one of these areas: Teaching, crime control, banking, medicine, transportation, or scientific research.

Can a computer think? Talk about different aspects of this question in a social studies or English class report or panel discussion. To prepare, consider these questions: What does it mean to "think?" How does a computer make decisions? How do people make decisions?

As a topic for a report in your math class, discuss the binary system of numbers. Be sure to explain how computers use the binary system and how it differs from the decimal system. Also include examples of binary addition.

As a topic for a report in your math class, find out what a flow chart is and how it is used. Draw a flow chart of a simple system, such as your system for getting ready for school in the morning, or a system for planning and cooking a meal.

Join a Computer Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for information on careers in programming and systems analysis to the American Federation of Information Processing Societies, 210 Summit Avenue, Montvale, New Jersey 07645.

Related Occupations

Mathematics and statistics are very important in the work of computer programmers and systems analysts, but many other workers use math and statistics too. Six of them describe their jobs below. See if you can figure out who they are. To help you, there is a list of the six occupations.

1. My job is doing basic research in mathematics. I develop new ideas and techniques in algebra, geometry, topology, and other branches of math. My discoveries are used widely in science, engineering, and many other fields. Who am I?

2. I work for an insurance company. I figure out how often different groups of drivers—young drivers, city drivers, truckdrivers, and sports car drivers, for example—have accidents. The company uses this information to set the prices of its insurance policies. Who am I?

3. When a business is not running smoothly, I use mathematics and computers to solve the problem. First I find out from the managers exactly what the trouble is. Then I make a mathematical model of the situation and feed it to the computer, which helps me find possible solutions. After comparing these I make my recommendations. Who am I?

4. I work for a company doing scientific research. The scientists collect large quantities of raw information from their experiments. With the help of computers and mathematical formulas, I reduce and convert this information into a more usable form. Who am I?

5. I help scientists gather reliable statistics for their research. I plan and conduct surveys to collect the information. Then I analyze the results to see how reliable they are. Computers help me a great deal. Who am I?

6. I work for a corporation that invests a great deal of money in the stock market. My job is to advise the company how best to spend its money. I study the market and my company's financial situation. I collect information, write reports, and make recommendations. Who am I?

Actuary

Financial analyst

Mathematical technician

Mathematician

Operations research analyst

Statistician

See answers at end of chapter.

Office Occupations

Job Facts

There isn't room in this book for a story about every office occupation. However, you'll find some important facts about 33 of these occupations in the following section. If you want additional information about any of them you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
CLERICAL OCCUPATIONS			
Bookkeeping Workers	All kinds of firms employ bookkeeping workers. About a third of the jobs are in wholesale and retail trade.	Employers generally hire high school graduates who have taken business arithmetic, bookkeeping, and principles of accounting. Some high school students learn bookkeeping on the job through work-study programs. College courses are necessary for some jobs.	An increasing amount of bookkeeping is done by machines, rather than by hand.
Cashiers	Cashiers work in all kinds of business establishments. Supermarkets and food stores employ more cashiers than any other kind of store.	Employers prefer high school graduates. Courses in bookkeeping, business arithmetic, and typing are good preparation. Many schools offer cashier training as part of distributive education programs. But cashiers generally train on the job.	More and more stores and supermarkets are using computerized checkout systems. Many cashiers work part time.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Collection Workers	Most collectors work for banks, loan companies, and collection agencies. Others work for wholesale and retail businesses.	High school graduation is necessary for most beginning jobs. Experience in person-to-person contact is helpful, because collectors have to be able to persuade people to pay their bills. Most training takes place on the job.	Collectors do most of their work over the phone.
File Clerks	File clerks work for all kinds of businesses. About half work in banks, insurance companies, factories, or government agencies.	Employers prefer to hire high school graduates who can read quickly and accurately, spell well, and type. Beginning workers learn their employer's filing system on the job.	Filing often is a job for beginning office workers. After working a while, file clerks may be promoted to jobs as typists, secretaries, or office machine operators.
Office Machine Operators	Manufacturing companies, banks, insurance companies, and wholesale and retail stores all employ office machine operators. Some operators work for businesses that specialize in providing word-processing, copying, and other clerical services.	Employers prefer to hire high school graduates who can type and operate an adding machine or calculator. Workers are trained on the job for the particular machines they are to operate.	There are many kinds of office machine operators. Their job titles depend on the machine they use, such as: Bookkeeping machine operators, calculating machine operators, and duplicating machine operators. Workers may operate only one machine or a variety of machines, depending on their job and experience.
Postal Clerks	Many clerks are employed at local post offices, but most work at one of the more than 300 mail processing centers across the country.	High school graduates 16 and older as well as anyone 18 and older may apply. They must pass several tests that measure their clerical and physical ability. Postal clerks are trained on the job.	The Postal Service classifies clerks into four categories. *Casual* employees help with unusually large volumes of mail during Christmas and other peak mailing periods. *Part-time flexible* employees work regularly, but not according to a set schedule, as *part-time regular* employees do. Most clerks begin as part-time flexible workers while waiting for an opening as a *full-time* clerk.
Receptionists	Almost every kind of organization employs receptionists, but about half work in the health field, for doctors, dentists, and hospitals.	Employers usually hire high school graduates. Courses in English, typing, and basic bookkeeping are helpful. A neat appearance and pleasant manner are very important.	Receptionist is a job for beginning office workers. In a large office, however, a receptionist with clerical skills may be promoted to typist, secretary, or administrative assistant.
Secretaries and Stenographers	Two out of three secretaries and stenographers work in banks, insurance companies, real estate firms, government agencies, and other organizations. Medical secretaries work for doctors, and legal secretaries work for lawyers. Executive secretaries work for top officials in business and government.	Employers generally hire high school graduates and may prefer people with additional business or secretarial training. Some secretarial jobs involve a great deal of responsibility, judgment, and skill. For these, secretarial school or college is often a must.	Secretaries do clerical work and handle many of the business and administrative details that need to be taken care of in offices of all kinds. Many of them work temporarily or part time. Experienced secretaries may be promoted to jobs as administrative assistants, office managers, or executive secretaries.

Office Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Shipping and Receiving Clerks	Factories employ more than half of all clerks. Large numbers also work for wholesale houses and retail stores.	Employers prefer high school graduates who have taken some business courses. Legible handwriting is important. Training generally takes place on the job.	Clerks often must perform strenuous work in cold, drafty, dirty warehouses. Occasionally they may have to work overtime to unload a late shipment.
Statistical Clerks	Although nearly every industry employs statistical clerks, most work in finance, insurance, and real estate companies, in manufacturing firms, and in government.	Employers prefer high school graduates who have had math courses and can do detailed work. Training in data processing, bookkeeping, and typing is helpful.	Many clerks work closely with computers.
Stock Clerks	Factories, wholesale firms, and retail stores employ most stock clerks. Others work for airlines, government agencies, and hospitals.	Employers prefer high school graduates with basic reading, writing, and math skills. Training usually occurs on the job.	Clerks spend much of their day on their feet. They often work in damp, drafty stockrooms and may have to do considerable bending and lifting. With experience, clerks may move to higher positions in stock handling or to sales positions.
Typists	Almost every kind of organization employs typists, though most work in factories, banks, insurance companies, real estate firms, and government agencies.	Most employers require high school graduates with good English skills who can type 50 to 60 words per minute. The ability to operate copying and adding machines is helpful.	A typist's job is often a beginning job; from there it is possible to move into a job as a secretary, office machine operator, or computer operator. One typist in four works part time.
COMPUTER OCCUPATIONS			
Computer Operating Personnel	Most operating personnel work for manufacturers, banks, wholesale and retail businesses, government agencies, and data processing firms. There are several different kinds of operating personnel, including key entry operators and high-speed printer operators.	Employers usually hire high school graduates, and prefer people with college training in data processing. Beginners are trained on the job.	Because computers must be operated at carefully controlled temperatures, operators work in air-conditioned rooms.
Programmers	Most programmers work for large firms that have big computer systems. This includes manufacturers, banks, insurance companies, data processing firms, and government agencies.	College training generally is necessary for a job as a programmer. Firms that use computers to handle scientific and engineering problems usually require their programmers to have a bachelor's degree, preferably in science or engineering.	Programmers occasionally must work nights and weekends, in order to use the computer when it is available.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Systems Analysts	Most systems analysts work for manufacturers, banks, insurance companies, and data processing firms. Geographically, employment is concentrated in the midwestern and northeastern States.	Employers prefer college graduates with a degree in a field related to the kind of work the company does, and with training in computer techniques, concepts, and programming. Prior experience with computers in important; many systems analysts start out as programmers.	Systems analysts normally do not work the odd hours that other computer workers do, though occasionally they must work evenings or weekends to finish a project.
BANKING OCCUPATIONS			
Bank Clerks	Although clerks work in every branch bank, the larger branches and main offices employ most of the more specialized workers.	A high school diploma is usually sufficient. Courses in typing, bookkeeping, and other clerical areas are helpful. Clerks receive their training on the job.	The work of bank clerks is often very detailed and repetitious.
Bank Officers	Every branch bank employs officers, but the greatest variety and specialization are found in the large branches and central offices.	Banks prefer college graduates for management training. A degree in business, accounting, or economics is excellent preparation, though graduates in other fields are in demand, too. Occasionally, banks promote outstanding tellers and clerks to jobs as officers.	Officers can specialize in a wide range of areas, such as lending, trust management, or correspondence banking.
Bank Tellers	Specialized tellers generally work in large and main branch banks, while smaller branches usually employ all-purpose tellers.	Employers prefer high school graduates. Basic qualities such as clerical skill, friendliness, neatness, courtesy, and attentiveness are important.	A teller's job is repetitive and demands great attention to detail.
INSURANCE OCCUPATIONS			
Actuaries	Two out of three actuaries work for insurance companies, mostly those that handle life insurance.	Actuaries generally need a bachelor's degree in math, statistics, or actuarial science. They have to pass a series of difficult exams given by one of the professional societies of actuaries.	Most actuaries specialize in life and health insurance, property insurance, or pension plans.
Claim Representatives	While a handful of claim representatives work for banks, finance companies, and other business firms, the majority work for insurance companies.	Many employers prefer college graduates in almost any field, though specialized work experience will often be an adequate substitute for a degree. In some States, claim representatives must have a license.	Many claim settlements involve a great deal of travel.
Underwriters	Most work for property and liability insurance companies. The rest work for life or health insurance companies.	A bachelor's degree in almost any field is preferred for beginning positions. However, to get ahead, further study is necessary.	The work of underwriters is very detailed and carries a great deal of responsibility.

Office Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
ADMINISTRATIVE OCCUPATIONS			
Accountants	There are three main kinds of accountants. *Management accountants* are the most numerous. They handle the records of the companies they work for. *Public accountants* analyze and prepare financial reports for individuals and businesses. They work for, or own, independent accounting firms. *Government accountants* examine the records of government agencies and audit private businesses and individuals whose financial affairs are subject to government regulations.	Most large employers prefer college graduates with a bachelor's degree in accounting or a closely related field. A master's degree may help in some cases, as would computer training. In order to move up, public accountants sooner or later must get their certification, by passing a State exam.	Accountants often specialize in one phase of accounting, such as auditing, tax matters, or management consulting
Advertising Workers	Advertising workers have jobs with many different kinds of firms. First and foremost, they work for advertising agencies. But they also work in the advertising departments of manufacturing firms, retail stores, and banks, or for printers, art studios, letter shops, and similar businesses.	Most employers prefer college graduates, but work experience may be more important than educational background.	People in this occupation work under great pressure to do the best job in the shortest period of time. Often they work long or odd hours to meet deadlines.
Buyers	Buyers work for retail businesses of every size and variety all across the country. Most, however, work in large cities.	A college degree in almost any field is sufficient for beginning positions. Training takes place on the job.	Buyers regulate their own schedules and often work long or odd hours. They may spend some time traveling, depending on the kind of merchandise they buy.
City Managers	Three out of four city managers work for cities of fewer than 25,000 inhabitants, though many larger cities employ managers, too.	A master's degree in public or business administration is almost essential for a career in city management.	Managers often work long, difficult hours, especially during times of emergency.
Credit Managers	Wholesale and retail businesses employ about half of all credit managers, while a third work for manufacturers and financial institutions.	Employers prefer college graduates who have majored in business administration, economics, or accounting.	Highly qualified credit managers can advance to top-level executive positions.
Industrial Traffic Managers	Most industrial traffic managers work for manufacturing firms. Some work for wholesale and retail establishments.	Employers prefer, and in some cases require, college graduates for this job.	Industrial traffic managers analyze the cost and efficiency of various ways of transporting goods. They need to know the government regulations that affect that transport.
Lawyers	Three out of four lawyers work in law firms. The remainder work for businesses, private organizations, or government.	A bachelor's degree and 3 years of law school are required for a law degree. Degree holders must pass a bar exam to practice law.	Many lawyers specialize in a particular legal field, such as tax, patent, divorce, or criminal law.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Market Research Workers	Manufacturers, advertising agencies, and independent research organizations employ most market research workers. However, some work for retail stores, broadcasting companies, and newspapers.	A bachelor's degree in a field such as marketing, business, psychology, or statistics is necessary for a beginning job. However, to get ahead, graduate training is almost essential.	Market research activity goes through ups and downs that depend on the general health of our economy.
Personnel and Labor Relations Workers	Three out of four workers in this occupation are employed in private industry, including manufacturers, banks, and insurance companies. Government agencies also employ large numbers of these workers.	A bachelor's degree in personnel administration, industrial and labor relations, business, or liberal arts is desirable, depending upon the employer. For labor relations work, graduate study is often necessary.	Getting along with people is an essential part of this occupation.
Planners	Most planners work for city, county, or regional planning agencies. Some work for government agencies that deal with housing, transportation, or environmental protection. Still other planners work for public interest organizations or consulting firms.	Employers prefer applicants with graduate training in urban or regional planning. However, people with bachelor's degrees in city planning, architecture, landscape architecture, or engineering also qualify.	In large organizations, planners specialize in areas such as housing or economics, while in small offices they must work in several different areas.
Public Relations Workers	Public relations workers present their employer's image to the public. They work for organizations of all kinds: Manufacturers, insurance companies, public utilities, transportation companies, hospitals, colleges and universities, and government agencies.	A college education with public relations experience is excellent preparation. The appropriate field of study depends on the employer's needs.	Public relations workers often have to work overtime to finish a project. They occasionally travel on business.
Purchasing Agents	About half of all purchasing agents work for manufacturing firms, government agencies, construction firms, hospitals, schools, and other places that buy in very large quantities.	Large firms usually hire college graduates and prefer applicants with a master's degree in business administration. Small firms hire people with fewer years of college.	In large organizations, agents usually specialize in one or more specific items, such as steel or lumber.

Answers to Related Occupations

BANK OFFICER

1. a, 2. c, 3. b, 4. c, 5. b, 6. c, 7. b, 8. a.

PLANNER

1. d, 2. b, 3. c, 4. f, 5. g, 6. a, 7. e.

COMPUTER PROGRAMMER/SYSTEMS ANALYST

1. Mathematician, 2. Actuary, 3. Operations research analyst, 4. Mathematical technician, 5. Statistician, 6. Financial analyst.

Police officers must be able to give an accurate, detailed account of an event.

Exploring Careers

The late bell was ringing as Laura Meehan rushed into the classroom. Most of the students were already inside, chatting noisily with one another. At the sound of the bell, they quieted down and took their places.

"That was lucky," thought Laura. "I just made the bell." Laura was never *really* late, but she never arrived early, either. She always managed to slip in at the last minute. Even today, when she had an oral report to give.

Ms. Nazarian was getting things underway. "Good afternoon, class," the teacher said quietly. "Today we are going to begin the final phase of our unit on the history of occupations. For the last 6 weeks, you all have been working in small groups collecting facts about jobs that interest you. We will start the reports with a presentation by the committee chaired by Laura Meehan. They will tell us about the service occupations."

Five students came forward and seated themselves at a rectangular table facing the class. With her note cards in hand, Laura began.

"Six weeks ago, when this project was assigned, our group got together and decided that the first thing we had to do was agree on the topic we were going to study. Choosing a topic turned out to be harder than any of us expected and we were pretty confused for a while.

"We didn't have any trouble at first. Someone suggested researching circus occupations and we liked that idea. We thought it would be fun to find out about clowns, animal trainers, trapeze artists, and all the others. Then, as we talked, Craig started telling us about the job he had just started that week at Beefy's Inn. He's a short order cook there and most of the time he cooks hamburgers and steaks on the grill.

"Well, that started a discussion of the jobs that all of us have had at one time or another," Laura continued. "Joel Girdie, for example, has had a newspaper route for years. He puts in at least an hour every single day—more if it's raining and he has to bag the papers, and on days when he has to put in advertising supplements, comics, and other inserts. It's not always convenient to be up delivering papers at 5 a.m. But after several years, Joel has developed a routine. And he makes about $100 a month at it.

"Renee Harris is an assistant at a day camp. She's in charge of the younger children. She sees to it that they get their milk and crackers on time and that they take their naps. Of course, they're awake and raring to go most of the time and Renee directs them in games and activities. She really has her hands full.

"As for myself, I'm a lifeguard at the YWCA pool. I love being around water—I guess most of you know how much swimming I do—but being a lifeguard takes more than a love of the water. It takes a sense of responsibility and good judgment. You have to know when to stop youngsters from horsing around in the pool, for one thing. That takes firmness, but a sense of humor certainly helps! Giving water safety lessons is one of the things I like best about my job at the Y. When I teach other people the basics of swimming and water safety, I feel as though I'm passing on a skill that adds a lot to my own life.

Working in a restaurant kitchen is one way of finding out whether this field appeals to you.

"Because it was a logical starting point, our committee decided to take a closer look at the kinds of jobs we were already familiar with—those we had been working at ourselves. And that's when things started to get complicated. First of all, we learned that three of the jobs I've mentioned—short order cook, child care aide, and life-

Being a mail carrier may appeal to people who enjoy working outdoors.

guard—are service occupations. In these jobs, we are concerned with the care, comfort, well-being, or safety of others. The common thread is that we are performing a service for other people.

"But we were surprised to learn that newspaper carrier is not considered a service occupation. Joel complained and said the rest of us were wrong. After all, he said, he does something for people: He brings them the paper so they won't have to go out and buy it at the store. And he has to please his customers. Why, he wanted to know, wasn't *his* job a service occupation, too? Well, we ended up in an argument as to just what a service occupation really is, but fortunately Ms. Nazarian was able to straighten us out. She explained to us that Joel's job is a sales occupation. She went on to say that we had hit upon a very important point: Personal traits and job duties in the different occupational clusters *do* overlap. Dealing with people is an essential part of the job not just for service workers, but for sales workers as well. That's why it's important for workers in both clusters to be outgoing and good at getting along with people.

"Well, by that time, we had gotten so wrapped up in the issue that we decided to drop the circus occupations and concentrate on service occupations instead. And now we'll share the results of our research. Craig will present our committee's first report."

Food and Lodging Occupations

Somewhat nervous about giving his report, Craig cleared his throat and began. "Having recently been hired at Beefy's Inn, I naturally chose to do my research on the food and lodging occupations."

After a bit of friendly laughter from his classmates, Craig was reassured and continued.

"The need for temporary lodging has been with us since ancient times, ever since people traveled more than a day's journey from home. At first, travelers were well received and cared for by strangers. If a traveler happened to knock on your door, you were honored to invite the person in to spend the night. Often these evenings were spent swapping yarns, or tales of adventure.

"However, by the Middle Ages, so many people were traveling that something more was needed. Inns were established where paying guests could find a bed to sleep in and food to eat. And, importantly, these were places where you could feed and water your horse. In those days, you didn't expect to have a room to yourself. There might be two or three rooms altogether, each with several beds. If there were lots of travelers, you might find yourself sharing not only your room but your bed! If any of you have visited restored communities like Colonial Williamsburg, in Virginia, you've seen the sort of lodgings that were available to travelers in this country in the past.

"Things have changed a lot since then," continued Craig. "The lodging industry has grown tremendously. What was once a small number of local inns has become a network of hotels and motels. And the number of people it takes to run them has grown as well.

"These days, when guests enter a hotel or motel, they are greeted by the *desk clerk*. Desk clerks register guests, assign rooms, and hand out keys. *Bellhops* carry the guests' luggage and escort them to their rooms. They may run errands and answer questions for the guests. Hotels and motels need a large housekeeping staff to keep rooms and lobbies neat and clean. *Cleaning workers* make beds and provide fresh linens and towels; *linen room attendants* and *laundry room workers* mark and inspect the linens and operate the washing and pressing machines in the laundry. Keeping track of all these workers, and of the supplies needed to keep the hotel clean and attractive, is the job of the *executive housekeeper*. In every hotel, someone must make sure that everything is running smoothly and that the guests are satisfied. *Hotel managers and assistants* are in charge of every aspect of a hotel's operation. They oversee room reservations, banquet arrangements, safeguarding of guests' property, hiring and training of staff—anything at all connected with the way the hotel runs. But they

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pay particular attention to the business end of the operation, for it is up to them to be sure that the hotel is run efficiently and profitably. They depend on the *business staff* to help them handle the bookkeeping and accounting.

"And, of course, just about every hotel and motel has a *dining room and kitchen staff*. Food service workers have jobs in many places besides hotels. They prepare food wherever it is served away from home. They work in restaurants; in cafeterias; in schools and colleges; in hospitals and nursing homes; in prisons; in private clubs; at camps and resorts. They work at the food stands at sports events and county fairs. They even work for the catering firms that prepare the dinners we eat on airplanes and the sandwiches we get from vending machines. Food service workers make up one of the largest and fastest growing occupational groups in the country.

"Let's take a look at some of the occupations in this field," continued Craig. "We can start with my job. As Laura explained, I'm a short order cook. In my job, I cook the same sort of thing all the time—hamburgers and steaks, mostly. It didn't take very long to learn how to work with the grill correctly. What *is* important in a job like mine is the ability to work quickly under pressure. No matter what kind of food service operation you have in mind—from a gourmet restaurant to a school cafeteria—preparing the food correctly is the key to keeping customers happy. And that takes skill on the part of the *cooks and chefs*. The dishes that come from the kitchen reflect their creativity and skill, and often are the basis for a restaurant's reputation.

"But other things are important too. Atmosphere is one. Service is another. Those of you who are working as *waiters* and *waitresses* know how important good service is. You take customers' orders, serve their food, and give them personal attention to help them enjoy their meal. A pleasant manner is very important in this job. A good waiter or waitress can make all the difference between a delightful experience in a restaurant and an uncomfortable one.

"You'll find other food service workers in particular kinds of eating establishments. *Food counter workers* take food orders and collect payments in fast food restaurants and cafeterias. *Bartenders* mix drinks in bars, cocktail lounges, and restaurants that serve alcoholic beverages."

Craig paused, then asked for questions. Katie Maggs spoke up. "What's the difference between a cook and a chef?"

"The distinction isn't always clear cut," replied Craig. "Chefs usually are highly experienced cooks, but in fact a restaurant can give the title of chef to anyone at all.

"Still," he went on, "the way it usually works is this. The chef is the person who's in charge of the kitchen. He or she may not even do much cooking. The chef's job is to see to it that everyone else in the kitchen does things properly.

Waiters and waitresses often make more money in tips than in salary.

"You see, the work of a restaurant cook depends very much on the size of the restaurant. In a small restaurant, as in your own home, one person usually handles every part of the job. However, in a large restaurant, there usually are several cooks. A saute cook might take care of all the food requiring quick-frying. A fry cook might make the deep-fried foods like French fries and fried chicken. There might be other cooks as well: A broiler cook, a soup cook, a sauce cook, and a pastry chef. Now, in a kitchen as large as that, the person in charge would be a chef. Chefs have the skill and experience to oversee the operations of an entire kitchen. Their jobs often are administrative, while the cooks are the people who prepare the food we eat."

Craig looked around for more questions from the class. Greg Morisse raised his hand. "I'd like to know

Many waiters and waitresses are students who work part-time.

what kinds of kitchen jobs there are in a fast-food restaurant."

"Well," began Craig, "you have to remember that the kind of cooking done in these kitchens is far from the traditional image of a cook preparing an elaborate meal from scratch. Fast-food kitchens are geared toward efficiency and speed. Kitchen jobs are clearly designated. In a typical fast-food kitchen, you might see grill cooks fixing already-prepared meat patties; a bun cook toasting the buns; fry cooks handling French fries and fried chicken or fried fish; and "dressers" adding condiments such as lettuce, pickles, or dressing."

"Thanks, Craig," said Laura. "Now we'll hear from Alan."

Personal Service Occupations

"Personal service workers do things for individual customers," began Alan Oberstein. "And personal services are just that. Personal. They can include just about anything—shining customers' shoes, shampooing their hair, giving them a massage or a beauty treatment, helping them use exercise equipment in a health studio or gym, checking their coats at a theater, bringing them an umbrella at the beach. For all of these workers, pleasing the customer is an important part of the job."

He added, "Being a lawn care worker myself, I know how important a satisfied customer is. Mowing lawns is a real business for me during the summer, when the grass grows so fast. I handle four or five lawns on a regular basis. So I know that a satisfied customer is a steady customer!

"Throughout history," he continued, "people have paid attention to their appearance. They've used cosmetics and perfumes and cared about the way their hair looked since ancient times. Likenesses of barbers' razors have been found dating all the way back to the Bronze Age. And Egyptian women of 8,000 years ago, especially those of wealth and nobility, took great pains with their hair.

"In early times, *barbers* were known as barber-surgeons. As the name suggests, they performed surgery as well as barbering services. A barber-surgeon might have pulled your tooth, treated you for indigestion, cut your hair, or trimmed your beard. It was not until the late 1700's, a period of advances in medical science, that the two trades began to separate. Today, the red and white striped pole we see in front of a barber shop is a reminder of the barber-surgeon. The red symbolizes the patient's blood and the white stands for the bandages that were used.

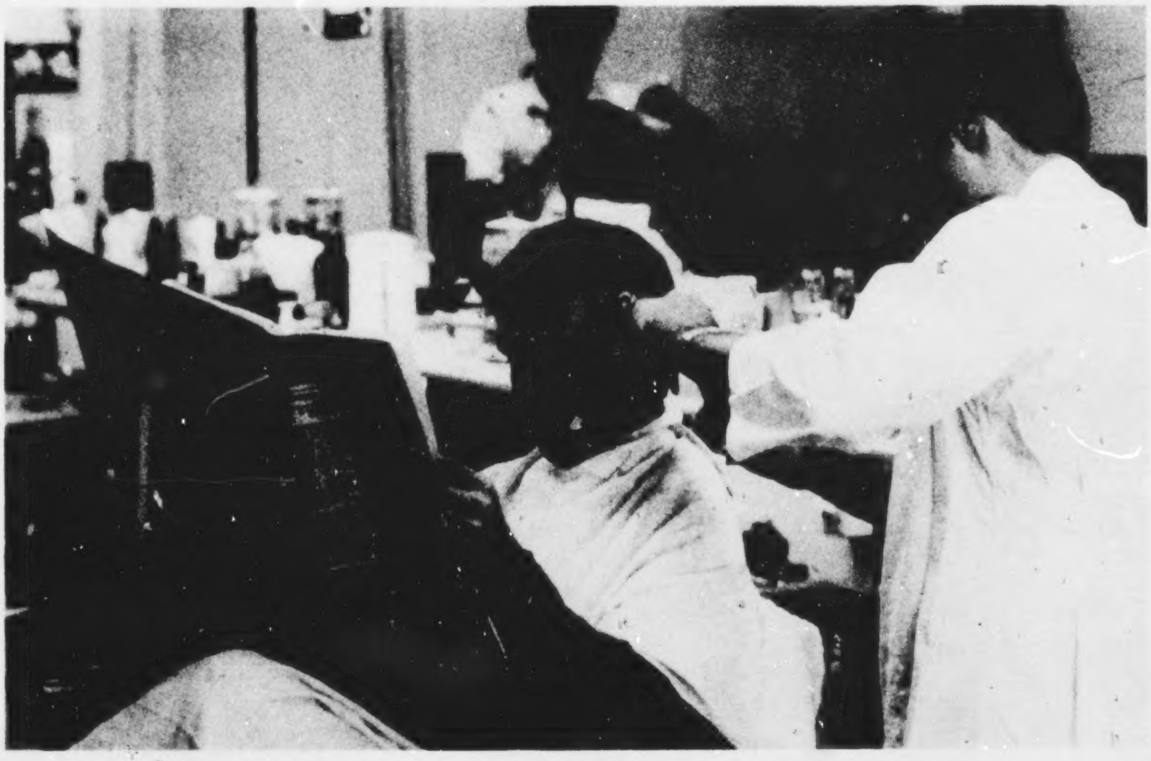
"The portraits of our founding fathers that we've all seen countless times show us how popular wigs were during the colonial period in America. Both men and women wore high-fashion powdered wigs. There were wigmakers in those days, but beauty salons as we know them didn't exist. Until the early 1900's, beauty services were almost always provided to customers in their own homes. And the "unisex" salon is an even more recent development, having come into its own in the 1970's.

"There are certain specialties in the field that you might want to know about. *Cosmetologists* shampoo, cut, style, and color hair. Also known as beauticians or beauty operators, they may straighten hair or make it curly, depending on the customer's wishes; give scalp treatments; and shape or color eyebrows and eyelashes. *Hair stylists* specialize in arranging and shaping customers' hair according to the latest fashion. *Wig dressers* do the same sort of thing for wigs and hair pieces. *Manicurists* clean, shape, and polish customers' fingernails and toenails. *Makeup artists* apply cosmetics and makeup materials such as wigs, beards, rouge, powder, and grease paint. They generally work with actors and actresses who are appearing on stage or in film or televison productions. *Electrologists* remove unwanted hair from their customers' skin using a method called electrolysis that involves a needle and the use of electricity.

"There's one more occupation concerned with personal appearance that I'd like to mention," continued Alan. "But first let me see if anyone can guess what it is. I'll give you a hint," he said. "There's a close association between this occupation and seafaring occupations."

The class looked at him blankly.

"Okay," he went on. "This personal service worker



Barber school training usually takes 9 to 12 months.

uses a needle but doesn't sew . . . "

"*Tattoo artist!*" interrupted Catherine Suter excitedly.

"Right," Alan replied. "Now I'm going to finish up with a few words about a special occupation. *Funeral directors* help make arrangements for burial. Few occupations call for the compassion and tact required of these workers, who deal with others in their time of deepest sorrow."

Alan put his notes down on the table. The class was suddenly subdued, and there were no questions. Laura's own report was next.

Private Household Occupations

"More people than you might think work in private households," Laura began. "They clean and maintain the house and yard, help care for children, and cook and serve meals. In fact, many of you have been private household workers yourselves—for a few hours, anyway. *Babysitting* is one of the many occupations in this category. And nearly all of us have done babysitting at one time or another!

"The occupation of household worker was more prominent in ancient times than it is today. For many centuries, the size of a family's household staff was a measure of its wealth and position in society. This is not the case today. Changes in our values and in our way of life have caused us to cut down on the use of servants and household help. Then, too, laborsaving machinery of all kinds is available today. Just think of all the household and garden appliances we have today: Power mowers, electric hedge clippers, vacuum cleaners, washing machines, dishwashers, food processors, microwave ovens. Machines like these make us less dependent on the manual labor provided in the past by a large staff of servants."

"Don't forget electric ice cream makers," exclaimed Jason Reynolds.

"You're right," agreed Laura.

"But still," she continued, "many families need help with chores or child care. Or they may need help caring for an elderly relative. Nearly 1 million people have jobs in private households in America. Most are *day workers* who clean. They usually make the beds, dust, vacuum,

Hair stylists need a sense of artistry.

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wash windows, and wax floors. They may also do the laundry and ironing, help with the cooking, and care for children. Some families hire full-time *child care workers* to help with the youngsters—to supervise their activities, prepare their meals, and bathe them and get them ready for bed.

"Arrangements vary, of course. Sometimes, families offer room and board in exchange for babysitting services or companionship for an elderly person. No money changes hands. If a family needs full-time cleaning or child care, however, they pay a wage and may provide room and board as well. Usually, though, the household workers live "out" rather than in the employer's household.

"Most households in America that employ household workers hire day workers to clean or child care workers to watch children. But there are other kinds of private household workers. *Companions* are hired to provide company for elderly or handicapped people, and sometimes, for children. Some families employ *cooks, launderers*, or *gardeners*. *Caretakers* do heavy household tasks and take care of such things as yard maintenance, window washing, and minor repairs. If the household staff is large, the family may employ a *housekeeper* or *butler* to supervise the other servants."

Having finished her report, Laura went ahead and introduced Joel.

These men wearing the traditional costume of Victorian chimney sweeps have started their own business—cleaning chimneys and fireplaces.

Cleaning Occupations

"Laura has just told you about workers who keep private households clean and in good repair," began Joel. "My report is about workers who clean buildings like this school.

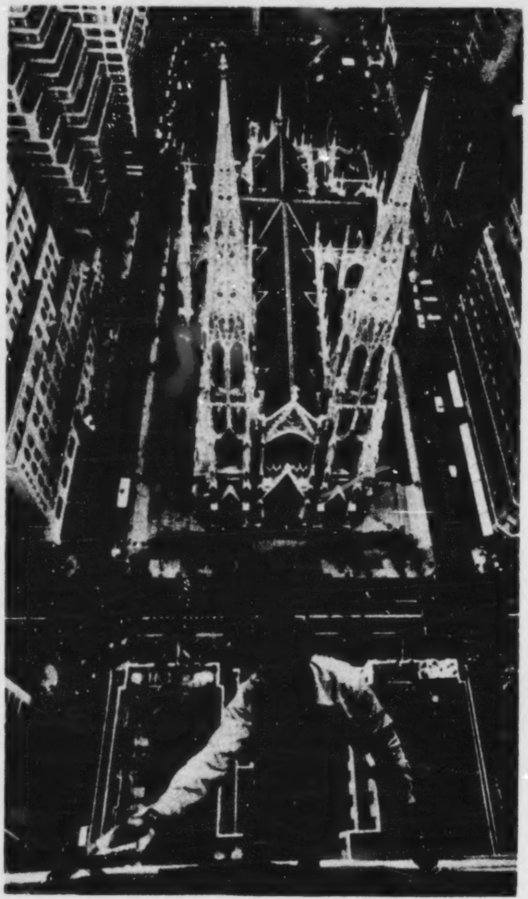
"Every building needs to be kept clean and in good condition for the comfort and safety of those who live or work there," Joel went on. "This involves not only sweeping or mopping the floors, but washing the windows, polishing furniture, vacuuming, emptying trash, cleaning the bathrooms, and getting rid of insects and rodents, too.

"In the past, when businesses and buildings were much smaller, innkeepers or shopkeepers might clean their establishments themselves. Or, more likely, they'd have a servant, a member of the family, or an employee do the job. After the Industrial Revolution, large plants and factories were built. Then large apartments and huge office buildings sprang up to provide a place for all the people in the rapidly growing cities. A way had to be found to keep such large buildings clean and safe. In time, cleaning services became specialized and they eventually became a business in their own right. Today, commercial cleaning firms handle this important task for the owners of many large buildings.

"But let's take a closer look at these workers. Craig has already told you about some of them. The cleaning staff in a hotel or motel is very important. Guests get annoyed quickly if there's no fresh linen or if no one comes in to clean their rooms. Craig mentioned the *housekeeper* who supervises the hotel's entire housekeeping department. That's an administrative job, as a rule. It takes organizational ability and skill in supervising others. The housekeeper may be in charge of dozens of workers who actually handle the fresh linens and clean the rooms. Housekeepers do similar kinds of work in hospitals and nursing homes, in boarding schools and colleges, and in prisons. They work anywhere, really, where large numbers of people stay overnight.

"*Porters, cleaners*, and *janitors* are responsible for the upkeep of offices, apartments, hospitals, industrial plants, and other buildings. They sweep, dust, mop, polish floors, clean walls and fixtures, and dispose of trash. They may take care of minor painting, plumbing, and carpentry repairs and tend furnaces or boilers. There often are other duties, too: Shoveling snow, cutting and trimming grass, setting up tables and chairs in auditoriums and halls.

"*Pest controllers* are the people we want to see when



This window washer has a remarkable view of the St. Patrick's Day parade.

we can't get rid of bugs ourselves. *Fumigators* release poisonous gas and set traps to kill termites, beetles, cockroaches, rats, and other pests. *Exterminators* treat buildings that already have been infested by termites.

"I don't think I need to explain what *window washers* do," said Joel with a smile, "but I think I should explain what a *sexton* is. This is the term used for a janitor at a church. Sextons keep the church buildings and furnishings clean and in good condition and keep the churchyard and cemetery looking neat. They also ring the church bells to announce services, care for clothing worn by clergy, and help out in other ways."

Bob finished reading from the last of his note cards. Laura took over once more. "And now," she said, "unless there are questions about Bob's report, we'll finish up with Renee."

Protective Service Occupations

"At the time of the American Revolution," Renee began, "there were no police departments and fire departments as we know them today. Instead, night watchmen were hired to patrol the streets of the cities and towns. Walking the dark streets carrying a lantern, they were on the lookout for fires, crimes, or trouble of any kind. If they saw something, they'd call out and warn the citizens who would come rushing from their homes to deal with the threat.

"The first modern police forces were established in America in the mid-1800's as cities like Philadelphia, Boston, and New York grew large and crowded. Conditions then were disorderly and violent; riots and fires took place so frequently that people decided they needed a better way of keeping order. By 1850, most of the major cities in the East had a police force that patrolled the city regularly to maintain order and discourage crime.

"Today, well trained and equipped *police officers* and *State police officers* uphold the law and maintain order in our communities and on the highways. *FBI special agents* investigate violations of Federal law and are concerned mostly with bank robberies, kidnappings, espionage, sabotage, and white-collar crimes such as embezzlement and dishonest land deals. *Correction officers* work in jails and prisons where they keep order and enforce rules and regulations. *Private detectives* are hired by people who want information about the actions of others. More often than not, they investigate business or domestic matters.

"Now I'd like to tell you about private guards," continued Renee. "Private guard services date back to the mid-1800's too. They first appeared outside the cities, in areas where new factories were being built or where mining operations were beginning. The guards in those days were hired to protect industrial property from riots, sabotage, and robbery. Today, *guards* still are needed in manufacturing plants, construction sites, and transportation terminals. But private security guards also work in museums, libraries, schools, hotels, supermarkets, department stores, apartment buildings, and offices.

"Modern fire departments also are fairly new. In the 1700's, at about the time fire insurance was being introduced, the insurance companies hired their own firefighters to take care of the properties they insured. When the alarm was sounded, all the companies in the city would rush to the fire. But only one company would fight to save the burning building—the company that recognized its own sign on the building. That system turned out to be impractical, and today all communities of any size have trained, professional *firefighters.*

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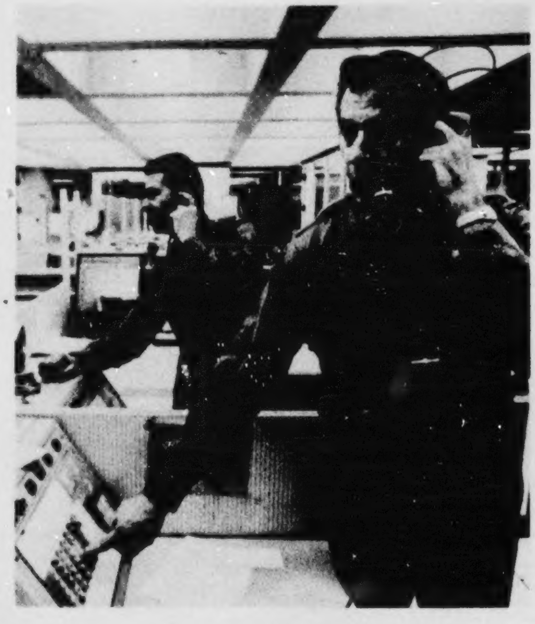
Many firefighters are on duty for 24 hours, then off for 48 hours.



These officers have been trained to handle emergency calls.

"There are other kinds of workers who protect the public," said Renee. "They're less familiar than the police officers and firefighters who keep our neighborhoods safe. But they, too, have an important job to do in protecting our well-being.

"*Construction inspectors* make sure that our homes and schools—and our highways and tunnels and bridges—are built safely. *Health inspectors* help us in many ways. They make sure that the food we buy in grocery stores and restaurants is clean and won't make us sick. They also make sure that the water we drink is pure, and that the water we swim in is safe. Health inspectors warn us when the air becomes so polluted that we should be careful, and perhaps stay inside. *Occupational safety and health workers* inspect mines, factories, farms, and business establishments to make sure that it isn't dangerous or unhealthy for the workers in those places. *Compliance officers* check to be sure that employers are obeying the laws that say that workers must be paid properly for the hours they work.

"As you can see," Renee continued, "the people in these jobs do very technical work. They need formal training in science or engineering, plus a great deal of experience in the field, to be able to tell whether a borderline situation is safe. After all, if they shut down a business unfairly, they create a hardship for the employer and all the workers there. Inspectors—like other people in the protective service occupations—must do their jobs thoroughly, fairly, and conscientiously."

Ms. Nazarian joined the group at the front of the room. "I'd like to congratulate each of you," she said, smiling. "Your committee did a fine job. You studied the topic thoroughly and presented the information in a very original way."

Turning to the class just as the bell began to ring, Ms. Nazarian continued, "And tomorrow we'll hear a report from Jennifer's committee."

What Makes a Good Service Worker?

The jobs of service workers differ a great deal. Yet, if they're good at what they do, all service workers have certain traits in common.

Doing things for other people is what the service occupations are all about. For this reason, *the ability to deal effectively with people* is a "must". This takes sensitivity, flexibility, and communication skills. Service workers must be good at adapting to different kinds of people in every imaginable situation. Police officers, for example, must be equally good at handling a lost child, a robbery suspect, or a crime victim. Child care workers must be good at supervising children and getting along with their parents. Hotel managers deal with people constantly. They must be firm in firing a dishonest employee, then turn around and greet a very important guest with just the right tone of welcome and respect.

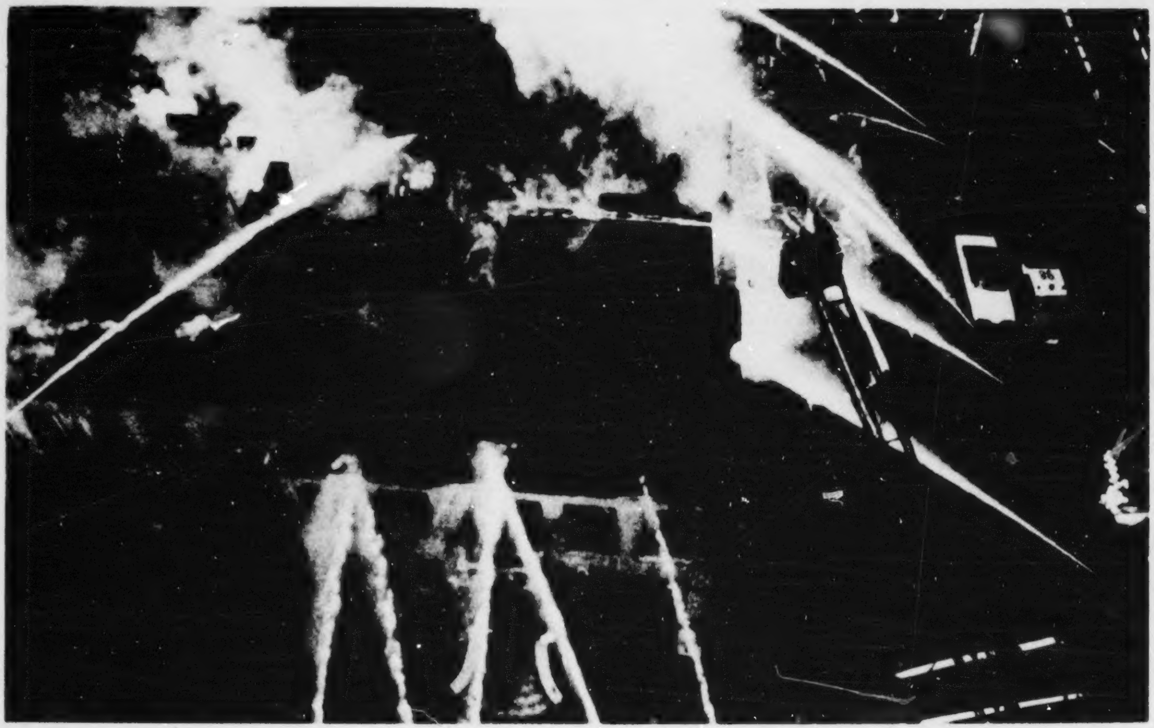
Bear in mind that it is important for service workers to pay close personal attention to their customers. People who are dissatisfied aren't likely to return. That's the reason for the saying, "The customer is always right." *A pleasant, outgoing personality* helps a great deal in jobs that involve pleasing a paying customer.

There are times when a great deal of *patience and understanding* are called for. After all, in a business where you're dealing with people most of the time, you're bound to run into people who are cranky, unreasonable, or just mean. Having an easygoing manner and a winning way with people can be a great asset, and is the key to building a steady flow of customers.

Many service workers need *the ability to keep calm and perform under pressure.* This is obvious in the case of firefighters, FBI special agents, and police officers. However, emergency situations crop up for other service workers too, and they must always be prepared for the unexpected. A cook may have to salvage the situation when the power goes off in the middle of a busy dinner hour. A hotel manager may have to contend with an angry guest complaining about a reservation mixup when the hotel is completely filled. A building service worker needs to know what steps to take when the air-conditioning system in a luxury apartment building breaks down during a heat wave. A cosmetologist may have to think fast when he or she discovers that something has gone wrong with a permanent or a color job. To cope with situations such as these, service workers must be levelheaded and unflappable. Imagination and resourcefulness help, too.

Many of the service occupations require *good health and physical stamina.* Bellhops carry baggage for hotel and motel guests and may run errands for them as well. Mail carriers, waiters and waitresses, cosmetologists, barbers, and private household workers are on their feet all day long. So are kitchen workers. Cooks, chefs, dishwashers, and others sometimes work in extremely uncomfortable temperatures, and always handle large, heavy pots and pans. Police officers and firefighters must be in good physical condition to handle the rigors of their jobs.

The ability to plan and organize the work is important.



Firefighting requires organization and teamwork.

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A chef must organize things so that the appetizers, main courses, salads, and desserts for 100 people or more are all ready at the proper time. Mail carriers must plan their routes so that everything is delivered on schedule. Building service workers and private household workers, like mail carriers, work independently and can set their own pace. But they have to be sure that everything gets done.

Business and managerial ability is important in some of these occupations. Funeral directors, for example, arrange both the personal and business aspects of a burial. Barbers, cosmetologists, and restaurant owners often operate their own businesses. This takes energy, drive, and the business sense to handle budgets, finances, suppliers, and staff. And business owners must also find the time to maintain a good relationship with their customers.

Flexibility about working hours can be very important. Long or unusual hours are commonplace for workers in food, lodging, and personal service occupations. Police and fire protection must be available around the clock, 7 days a week. Emergencies must be dealt with immediately, no matter how many hours you may already have worked. The standard 9-to-5 workday is often the exception rather than the rule in these occupations.

Training for Service Occupations

Like the members of Laura's committee, you may already know something about the service occupations through hobbies, jobs, or school activities. You may have done some babysitting or helped with younger children at a day care center or summer recreation program. You may have been a school safety aide or playground aide. It's likely that mowing the grass, shoveling snow, washing the dishes, or cleaning your room are among your household chores. Maybe you like to bake for your family or fix your friends' hair. Perhaps you have held a part-time job at a fast-food restaurant. All of these are good ways to try out the service occupations and to begin to develop useful skills and attitudes.

Formal training for service occupations varies a great deal. For a job as a dishwasher, for example, you don't need to complete high school. All the skills you'll need can be picked up on the job. But suppose you wanted to work as an industrial hygienist. Industrial hygienists do very technical work; they protect workers' health by studying the hazards created by noise, dust, and vapors. To get this sort of job, you would need a graduate degree in industrial hygiene, safety engineering, or a similar field. Those are the extremes. The training required for each of 27 service occupations is described in the Job Facts at the end of this chapter.

There are a number of different ways to prepare for a career in the food or lodging industries. They range all the way from vocational high school courses in cooking to 4-year college programs in food service or hotel administration. Training for high school graduates is offered at public and private vocational-technical schools and in 2-year community and junior colleges. Several highly specialized and well-respected programs in culinary arts—cooking and related food service skills—are in existence. Home study programs—correspondence courses—offer another way of learning about hotel and restaurant management. The hotel industry itself sponsors a home study program.

Large hotel and restaurant chains offer their own training programs for new workers. And the Armed Forces offer food service programs that provide training for executive chef, chef, cook, food and sanitation inspector, bread baker, pastry baker, and cafeteria manager.

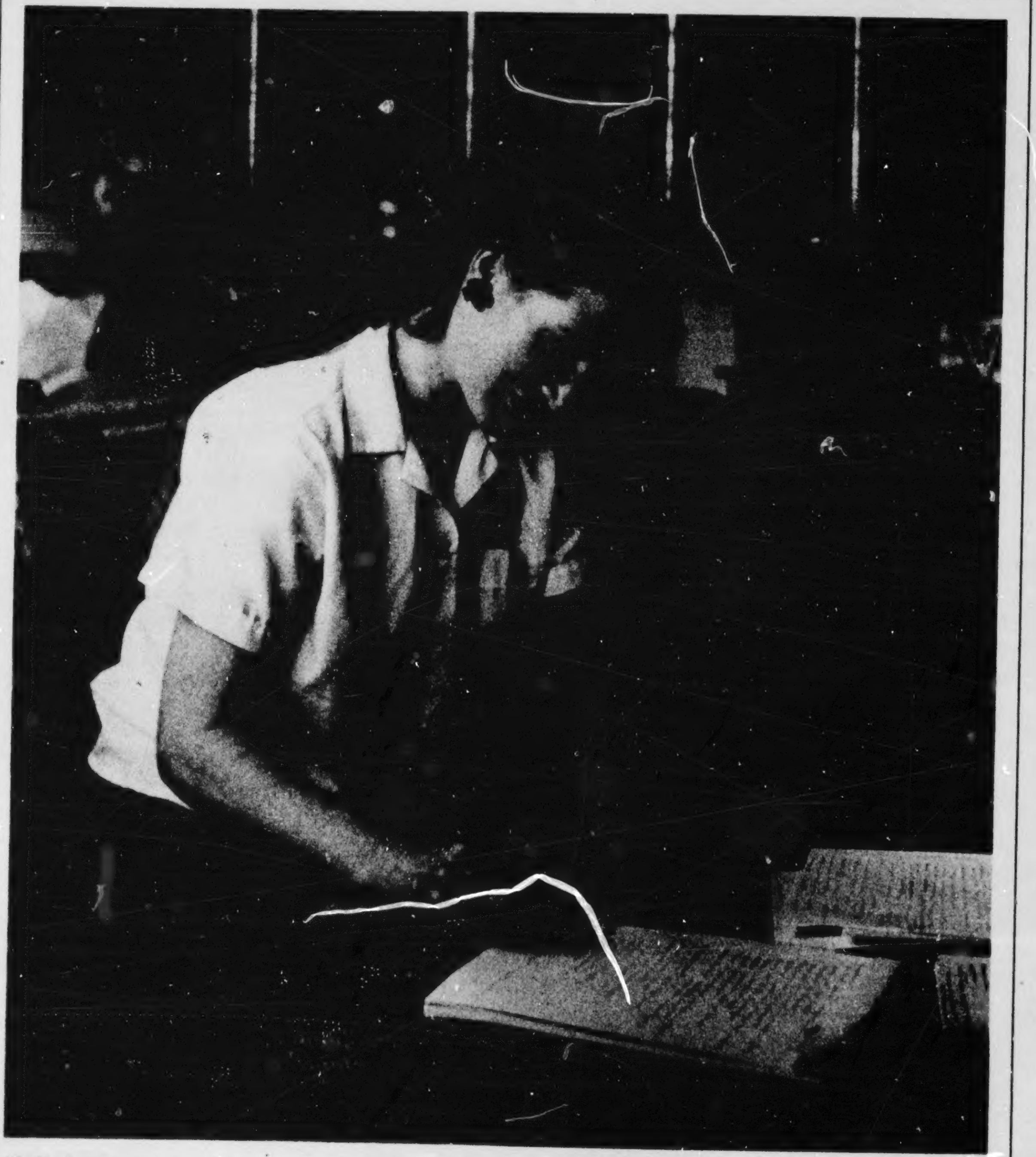
Barbers and cosmetologists must be licensed to practice their trade. Licensing is meant to protect the public. By establishing minimum requirements as to age, character, health, education, and knowledge of the trade, authorities in each State try to make sure that the people who work with your hair or give you beauty treatments know what they're doing. People can learn cosmetology or barbering in vocational high school programs or through apprenticeship. Or they can attend one of the many public and private schools that teach barbering or cosmetology. Training usually takes 6 months to 1 year.

As Renee pointed out, people like construction inspectors, health inspectors, and safety engineers need to know their fields thoroughly. This usually means a college degree in science or engineering, plus experience on the job. Construction inspectors, for example, benefit from having worked as building contractors or construction superintendents.

The kind of training needed to become a police officer or firefighter varies, for local departments all set their own requirements. Bear in mind, though, that almost all departments demand a high school diploma and some insist on several years of college, or a college degree. Even more training is needed to apply for a job as an FBI special agent. Special agents usually must be college graduates with a degree in accounting or law.

Regardless of the service occupation that interests you, plan to get your high school diploma. Not all jobs require it, of course, but promotion to higher paying and more responsible jobs usually comes faster if you have finished high school. Courses in English, home economics, and industrial arts would help you in some of these occupations. For others, courses in science and mathematics are very important.

Chef



"I plan menus well in advance," says Chef Nan Bogarty, "so that I have time to test the recipes."

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Nan glanced at the clock as she finished her work on next week's schedule for the kitchen staff. "Is it 9:30 already?" she thought. "I'd better get back to the kitchen and see how things are going. Lunch is not very far away."

Wednesday morning is the time that Nan Bogarty, the chef at the Beef Eaters Restaurant, ordinarily reserves for paperwork. She always starts by preparing the weekly schedule for the kitchen staff.

She needs some peace and quiet to juggle the schedules of the pastry chef, the line cooks, the pantry people, and the dishwashers—14 people altogether. Of course, only 4 or 5 of them are at work in the kitchen at any one time. But Nan has to plan work assignments so that the kitchen is covered 2 shifts a day, 7 days a week. That's not as easy as it sounds, for some of the kitchen staff work full time and others work part time. Some prefer to work nights so that they can go to school during the day; others like to work days so they can be with their families at night. Yes, it takes a bit of concentration to keep everything straight.

She also uses her paperwork time to work on the food budget and make notes about problems she wants to bring to the restaurant manager's attention. This month, for example, the price of romaine lettuce is astronomical. They can't stop using it in the Caesar salad, of course, but Nan plans to suggest that they hold down their food cost by substituting other kinds of lettuce in the greens they use for the salad bar.

Nan won't have any more time for paperwork this morning, though. She wants to spend a little extra time in the kitchen because there's been a last-minute change in staff. Ellen Radner, her most experienced line cook, had called in sick early this morning.

"There's always something," thought Nan as she straightened out her papers. "Last week it was Frank. But that was worse," she reminded herself. Frank had burned himself with fat from the deep fryer. It still bothered Nan to think about the accident, for kitchen safety was one of her responsibilities and she had called not one but several staff meetings to point out the hazards of a busy kitchen. Frank obviously hadn't paid any attention. Well, this week he was back at his station and it was Ellen—experienced, dependable Ellen—who was out.

"Lucky for me that Phil was able to come in and lend a hand." The thought restored Nan's good spirits. After all, it had been easy enough to get a substitute. Phil Olsen, one of the line cooks, had been home when Nan called at 8 o'clock and he had agreed to come right in. Sometimes Nan had to call three or four people before she succeeded in rounding up a substitute. Nonetheless, Phil was new here. He had worked at Beef Eaters for only a few weeks and Nan wasn't sure how well he had mastered their kitchen routine. Well, this morning she'd find out. He would be running the line and she would have a chance to observe. Phil had good support, though, with Sam Spirdone on the broiler and fryer.

Nan arranged her files and clipboard in a neat pile. All that would have to wait for a quiet moment later in the day. Right now, her top priority was making sure the kitchen was ready when Beef Eaters opened for lunch at 11:30 sharp.

As she entered the kitchen, she flinched. It was hot in there, drippingly, uncomfortably hot. "Summer is murder in this kitchen," she thought as she slipped on her white tennis headband. Her paper hat just wouldn't do in this weather. Some restaurant kitchens are air-conditioned. But Beef Eaters, a small business just beginning to establish a name for itself, operates on a shoestring. Air-conditioning had been out of the question when the kitchen equipment had been installed, and summertime was indeed murderously hot. The temperature in front of the range could climb as high as 130 degrees.

Nan walked briskly toward the range, where Phil was now in charge. An outburst near the salad station made her change course; something clearly was wrong over there. Jim Petras was staring in dismay at a carton that had just been delivered by Apex Produce.

Nan confers with one of the line cooks.

"Just look at the fruit that Apex sent over!" Jim exploded. "That's the second time this month it has been overripe. These bananas are much too soft for the flaming glazed bananas. We'll have to drop that from the menu today, and you know it's one of our best-selling desserts. And look at these strawberries! They're better suited to jam than my fresh strawberry tart."

It wasn't the first time Jim had raised the roof about the condition of the fruit. Jim Petras was one of the best dessert and pastry chefs in town, and the restaurant critics invariably praised his creations when they reviewed Beef Eaters. Jim took understandable pride in his efforts and insisted on working with only the finest ingredients.

Nan looked more closely at the fruit and agreed with Jim that the flaming glazed bananas would have to be dropped from the menu that day. Nan made a mental note to let the waiters and waitresses know and to inform the manager, too. The manager wouldn't be happy. That dessert was one of the restaurant's specialties, and a big seller. Then Nan took up the subject of the strawberry tarts. Jim, calmer now, agreed that he could probably make do. He'd salvage what he could of the strawberries and go ahead with his tarts. As she left him, Nan made another mental note: A strong complaint to Apex Produce was a "must."

Finally, Nan walked over to Phil, who was checking a beef roast in the oven. "Sam and I are doing okay, Nan," he said. "I think the new Hungarian goulash is good. Do you want to taste it?"

Nan complimented Phil on the way he was handling the job as she picked up a spoon to test the goulash.

The kitchen crew.

"Excellent," she said warmly. "I'm glad you noticed the change on the recipe card. Increasing the grated lemon rind certainly adds to the flavor," she added, putting down the spoon.

Nan looked as though she was about to walk away. Phil said hurriedly, "By the way, Nan, when I was slicing the meat for Swiss steak, I had a rough time. I don't understand it—I followed the procedures you showed us last week."

That had been at Nan's demonstration of ways to carve and slice meat. Her training sessions for the kitchen staff had started out as a series of useful tips and soon evolved into lessons in professional technique. Nan kept these lessons as informal as possible. But she covered her subjects in a crisp, professional manner. She explained kitchen safety and sanitation procedures; demonstrated food preparation and cooking techniques; and showed her staff how different garnishes—decorations—could make a dish look more appealing. She was getting a good response from the staff, few of whom had any formal training in food service. Because of their enthusiasm and willingness to learn, Nan found herself sharing many of the "trade secrets" she herself had learned over the years.

Nan had decided during her second year of college, where she had been studying oceanography, that college wasn't right for her. She had dropped out and taken the first job she could find—as a salad maker in a restaurant. Although she soon got tired of washing lettuce and chopping vegetables, she was fascinated by the restaurant business and decided to get the training she'd need to run a kitchen. She completed a 2-year program in culinary arts, taking such courses as food chemistry, equipment technology, and accounting and management. Nan then worked as an assistant chef in a hotel kitchen. After several years there, she accepted the top job in the kitchen here at Beef Eaters.

Nan looked up at the clock and noticed that it was 10 o'clock, time to fix lunch for the staff. Since Phil was new, she decided to take care of that for him while he finished his "prep" work. The staff took their lunch break at 10:45 ... too early for some but better than a chorus of growling stomachs until 3 o'clock!

She checked to see if the pantry and dish stations were ready for service, made sure the morning bread was delivered, and that the dining room attendants had filled the coffee machine and put out the garnish trays. Phil really appreciated her help.

By 11:45 the first food orders had come in to the kitchen, where they were pinned to the line spindle. As noon approached, the restaurant became much busier, and the tempo of the work increased. Nan helped out wherever it was necessary. She garnished the plates Phil put up and slipped in comments and advice whenever he had a moment to listen. The height of the lunch service, from 12:00 to 2:00, passed quickly. This time always seemed to fly by, for everyone was so busy there was hardly time to stop and take a breath.

As the dining room thinned out, the pace of work in the kitchen slowed. Nan split up the kitchen staff so that half of them could take a break while the others covered for them. When the first half came back to their stations, the others could sit down and cool off for a few minutes. They would all start preparation for dinner in the time left before the night crew arrived.

Nan fixed a plate of food for herself, picked up her clipboard, and went to a table in the back of the empty dining room to finish writing up her comments on the food budget. The rest of the paperwork would have to be squeezed in another time. She was pleased with Phil's first attempt at running the line. They had served 100 "covers" without a hitch.

"It certainly feels good to sit down," she thought.

Soon Nan was totally immersed in her estimate of food costs. She was startled to realize it was already 3:30 when Jim joined her at the table.

"About those bananas," he began abruptly. "I suppose I could use them for a Brazilian banana cake."

"Sounds like a good idea, Jim," said Nan, smiling.

As the temperamental pastry chef walked away, Nan remembered something. "One more thing to take care of," she said to herself. She went to the phone and dialed the Apex Produce Market.

"Hello, Mr. Yankelovich? This is Nan Bogarty at Beef Eaters and we seem to have a problem . . . . "

Exploring

Chefs must know a great deal about food. They need this expertise to plan menus, develop recipes, order foodstuffs, and supervise the preparation of meats, sauces, soups, vegetables, desserts, and other foods.

- Can you select fresh fruits and vegetables?
- Can you pick out good cuts of meat?
- Can you select fresh fish?

"No matter what, I'm responsible for what comes out of the kitchen."

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Chefs must be knowledgeable about nutrition. They must be able to plan meals and menus that are appetizing and nutritionally sound.

- Do you know the four food groups?
- Do you know what carbohydrates, fats, and proteins are and how the body uses them?
- Can you tell whether a meal is balanced?

Chefs must have an aesthetic sense where food is concerned. They must have an eye for attractive and original ways of presenting food.

- Do you like to decorate cakes or fix trays of appetizers? Do you like to decorate holiday cookies?
- Do you make an effort to plan meals that are balanced in color and texture as well as being nutritionally sound?
- Do you take the trouble to garnish sandwiches or hamburgers?
- Do you enjoy planning the table decorations for a party or a holiday?

Chefs must be well organized and be able to handle several things at once. It takes careful planning and good timing to prepare hundreds of meals during a single luncheon or dinner "turn."

- Are you good at estimating how long it will take to do your homework or a school project?
- Do you organize your time on tests so that you have enough time for each part?
- Are you good at keeping up with all the activities you're involved in? Do you get everything done without panicking?

Chefs must have leadership and communication skills. They supervise cooks and other kitchen workers and must be able to deal effectively with management, suppliers, and dining room staff.

- Are you a good leader? Do other people go along with your ideas when you're in charge? Do they follow your suggestions?
- Do you enjoy organizing trips, parties, sports events, picnics, and dances?
- Are you good at coordinating cookie sales, calendar sales, or other fund-raising projects?
- Do you enjoy working with other people on class projects?

Chefs must be able to think quickly and make decisions under pressure. Emergencies are not uncommon in restaurant kitchens.

- Are you levelheaded in an emergency?
- Could you keep calm and get help right away if the kitchen caught fire?
- Would you know what to do if an infant got hurt or stopped breathing while you were babysitting?
- Would you act sensibly if your brother or sister swallowed poison?

Chefs are responsible for keeping their kitchens clean and safe. They must know the local health and sanitation regulations and see to it that they are respected.

- Do you obey traffic regulations when you cross a street or ride your bicycle?
- Do you follow common safety precautions?
- Do you follow the instructions on the label when you use electric appliances?

Chefs need physical stamina. They spend hours on their feet, may have to lift heavy pots and pans, and sometimes work in very hot kitchens.

- Do you enjoy strenuous activities such as dancing, hiking, climbing, backpacking, running, jogging, swimming, and skiing?
- Do you like being active?

Suggested Activities

Get the recipe for the same dish from two different cookbooks. Follow them both and compare the results. What differences do you notice in ingredients, methods of preparation, and the final dish?

Plan and prepare dinner for your family one night. You might want to pick a foreign country or a region of the United States and prepare all the food in this style. Notice how much planning ahead you have to do: Deciding on the menu, looking up recipes, and assembling the ingredients.

Experiment with cooking the same food in various ways and observe the differences. Vegetables, for example, can be boiled, steamed, baked, sauteed, or deep fried.

Learn what to look for in selecting meats, fish, poultry, fruits, and vegetables for quality and freshness.

Exploring Careers

Enter a baking or a cooking contest.

Offer to help in a food co-op if there is one in your neighborhood. You can gain valuable experience in ordering food, picking up merchandise, and keeping inventory.

Volunteer to help in the school cafeteria.

Volunteer your services to your local Meals-on-Wheels program. Volunteers are needed to deliver meals to people's homes; they may also help with food preparation, packaging, and clerical work.

Invite one or more food service workers to speak to your class about their jobs. You might invite the manager of the school cafeteria; a chef or cook at a local restaurant; or the manager of a fast-food restaurant. Ask them to describe the work they do and the training they needed to get their jobs. Prepare questions in advance.

Contact your local health department and invite a health inspector to speak to your class. Inspectors visit restaurants regularly to check the cleanliness and safety of food served to the public. You might ask the speaker to discuss his or her job and the training needed to get the job; to explain what inspectors look for when they inspect a restaurant; and to tell you what would be sufficient cause to close a restaurant down. Prepare questions in advance.

Prepare a report on the sources of some familiar seasonings and spices for a social studies class. You might start your research by looking in the encyclopedia, then write for information to one of the companies that package and distribute herbs and spices.

For a science or health class, prepare a report on the importance of vitamins, carbohydrates, fats, calories, and protein to your body. Explain the way in which each of these helps to maintain your metabolism. (Metabolism is the process by which your body breaks down the food you eat for its energy.)

Use the topic of bacteria growth in food for a science fair project.

Determine the nutritional value of a typical fast-food meal—a hamburger, milkshake, and French fries, for example. How does this compare with the recommended daily requirements?

Plan the layout and design of a printed menu.

Learn the four food groups and match the foods you eat during the day with their proper group.

Make a list of safety and first aid rules that should be observed in the kitchen; for example, what to do in case of a fire and how to treat cuts and burns.

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as cooking.

Join a chapter of HERO (Home Economics Related Occupations) if your school has one. HERO chapters help students relate their home economics curriculum to careers. If your school does not have a chapter, you can ask your home economics teacher to sponsor one. Your teacher can obtain information by writing FHA/HERO Chapters, 2010 Massachusetts Avenue, N.W., Washington, D.C. 20036.

If you are a Boy Scout or Girl Scout, try for badges in Cooking and First Aid.

Assume that you are head chef in a restaurant. A cookbook gives the following recipe for stew to feed six people:

2 lbs. stew meat
2 lbs. potatoes
5 large carrots
1 large onion
1 teaspoon salt
1 cup mixed vegetables

a. How much of each ingredient will you need to feed 60 people?
b. How much must you spend if food prices are: $1.49 per pound for stew meat, $.35 per pound for potatoes, $.05 each for carrots, $.15 each for onions, $.01 per teaspoon of salt, and $.30 per cup of mixed vegetables?
c. Assume you can get a 25-percent discount because you buy in large quantities. How much will your food bill be to make the stew for 60 people?

In restaurants, ingredients often are measured by weight instead of volume because this method is simpler and more accurate. Find the following measurements:

1 teaspoon butter = approximately _____ grams
1 tablespoon salt = approximately _____ grams
1 cup flour = approximately _____ grams

See answers at end of chapter.

For information about a career as a chef, write to: Culinary Institute of America, P.O. Box 53, Hyde Park, New York 12538; Educational Director, National Institute for the Food Service Industry, 120 South Riverside Plaza, Chicago, Illinois 60606; or Educational Institute of the American Hotel and Motel

Association, 1407 South Harrison Rd., East Lansing, Michigan 48823. For information on the American Culinary Federation's apprenticeship program for cooks and chefs, write to: American Culinary Federation, Suite 1, 920 Long Boulevard, Lansing, Michigan 48910.

Related Occupations

Besides the chef, many other workers are involved in planning meals and preparing food. The following puzzle includes 18 of these occupations. See how many you can find. The words may be forwards or backwards, and horizontal, vertical, or diagonal.

BAKER
BANQUET CHEF
BARBECUE COOK
BROILER COOK
CAFETERIA COOK
CATERER
DESSERT COOK
EXECUTIVE CHEF
FRY COOK
PASTRY CHEF
ROAST COOK
SALAD MAKER
SAUCE CHEF
SHORT ORDER COOK
SPECIALTY COOK
SOUP COOK
SOUS CHEF
VEGETABLE COOK

O	K	O	C	A	F	E	T	E	R	I	A	C	O	O	K	E	H	C
B	R	O	I	L	E	R	C	O	O	K	P	H	I	X	Y	F	E	P
A	A	P	E	S	N	V	A	O	A	S	O	L	C	R	U	Q	F	D
N	R	K	X	O	T	H	P	A	S	T	R	Y	C	H	E	F	U	E
Q	B	O	E	T	E	I	K	N	T	W	Y	H	B	E	M	R	T	S
U	X	C	C	R	O	H	T	A	C	R	K	E	G	I	R	Y	Z	S
E	Z	D	U	R	N	Y	C	F	O	O	V	O	V	E	C	C	H	E
T	E	L	T	E	R	B	E	R	O	C	O	L	K	Y	F	O	I	R
C	M	F	I	I	T	H	B	C	K	K	X	A	B	E	R	O	N	T
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E	O	H	E	E	A	U	G	L	N	D	R	S	O	L	P	Q	C	O
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S	Q	U	H	S	L	D	E	L	I	P	D	C	H	E	Q	U	R	K
R	A	V	E	G	E	T	A	B	L	E	C	O	O	K	N	M	P	Y
S	D	E	F	C	I	S	H	O	R	T	C	M	P	O	S	I	T	S
M	L	U	C	E	S	P	E	C	I	A	L	T	Y	C	O	O	K	P
A	N	O	V	A	J	K	O	O	C	E	U	C	E	B	R	A	B	I
S	R	Q	U	X	S	O	U	S	C	H	E	F	P	Y	Q	U	L	L
V	T	G	H	A	K	O	C	Y	H	L	N	C	A	T	E	R	E	R

See answers at end of chapter.

Building Service Worker

Harry Rand has a custodial job at Broadview Elementary School.

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Harry stretched his arms and sighed as he entered his office. "It's 11:30 already, and this is the first chance I've had to stop!" he thought, as he fell into his chair. "I'm glad every day isn't this hectic."

Harry Rand, the head building service worker for Broadview Elementary School, had been on the job since 7 o'clock that morning—a full 30 minutes ahead of schedule. He often arrived early when he planned to cut the grass. That way he could mow completely around the building before the children arrived. Once school was in progress, he did the lawn by the basketball courts and softball field so he wouldn't disturb classes. Cutting the grass was quite a chore. Harry was glad it was mid-October; this probably was the last time he'd have to mow until next spring.

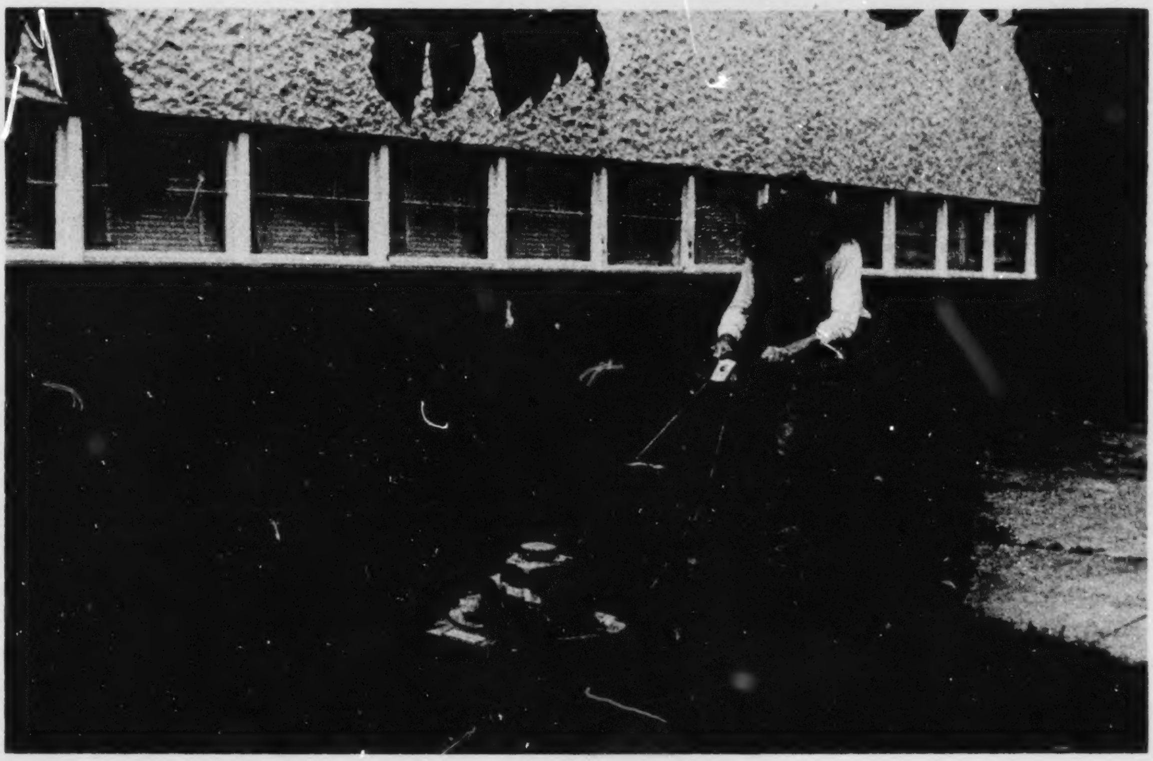
When it came to mowing the lawn, Harry was not willing to rush. He paid a lot of attention to trimming the edges, for he felt the lawn's appearance "said something" about himself. In fact, come to think of it, that's why he made such a point of keeping the inside of the school in good repair and as neat and clean as possible.

As he returned to the building after putting the mowing equipment away, Harry had run into Brian "Smitty" Smith, another member of the building service staff.

"Morning, Harry," said Smitty. "Looks like you've been hard at work."

Smitty had been working at Broadview Elementary for just a few months. Unlike Harry, who was assigned to this school full time, Smitty was a member of the "roving crew." He helped out wherever he was needed, generally working for a few days at one school and then going to another. Besides working part time with the building service crew, Smitty took courses at night towards his high school diploma. Harry admired Smitty's ambition and sometimes thought about signing up for a night school course himself.

Together they headed for the boiler room. Checking the equipment in this room was a daily ritual for Harry, usually the first thing he did each morning. This week, however, he had waited for Smitty each day. The first few days, Harry did most of the work, explaining as he went along. Today, Smitty was going to try it on his own,



Harry takes pride in keeping the school neat and clean. "I feel that the way the school looks says something about me."

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with Harry there to observe and guide. This on-the-job training was part of the course on boiler operations that Smitty had to pass in order to meet the County Board of Education's requirements for its building service workers.

The two men unlocked the door marked, "Danger—Boiler Room" and faced an arrangement of pipes, valves, gauges, and machinery. Smitty began by checking the gauge attached to the steam boiler. This was just a matter of reading the water level.

"Looks okay to me," he commented. Harry nodded in agreement.

Then Smitty checked the boiler for anything that might be wrong. He looked to see if smoke was coming out where it shouldn't, or to see if any of the tubes were leaking. Next he cleaned the oil filter. Then he finished his inspection of the boiler room by checking the motor and belts on the pumps and air compressor.

"Too bad, no major problems for you today," joked Harry.

You never knew when something would go wrong; machinery generally broke down at the worst possible moment. Harry tried to keep a close eye on the equipment so that he could spot trouble early. Harry didn't fix the machinery himself, though. Instead, he called the county maintenance workers to come over and make repairs or replace parts.

Harry glanced at his watch and realized that he was running late. He hurried toward the school cafeteria.

"Fine morning, isn't it, Harry?" said Audrey Wayne, the cafeteria manager. "The milk is already on trays. It's in the last refrigerator on the right."

Harry nodded and walked across the large room to the refrigerators. Delivering milk every morning to the younger children at Broadview was one of Harry's favorite tasks. This "Eight ounces of energy to boost your day" program had been started a few years ago for the first, second, and third graders. It was part of a county-wide nutrition program for youngsters.

One of the things Harry liked about the program was

Delivering milk every morning to the younger children at Broadview is one of Harry's favorite tasks.

the opportunity to get to know the teachers better. Even more important, to his way of thinking, was the contact with the children. He enjoyed getting to know them, and was pleased that so many of the younger children treated him as a special friend. Previously, most of his contact had been with the older children at Broadview, when he umpired for their softball games.

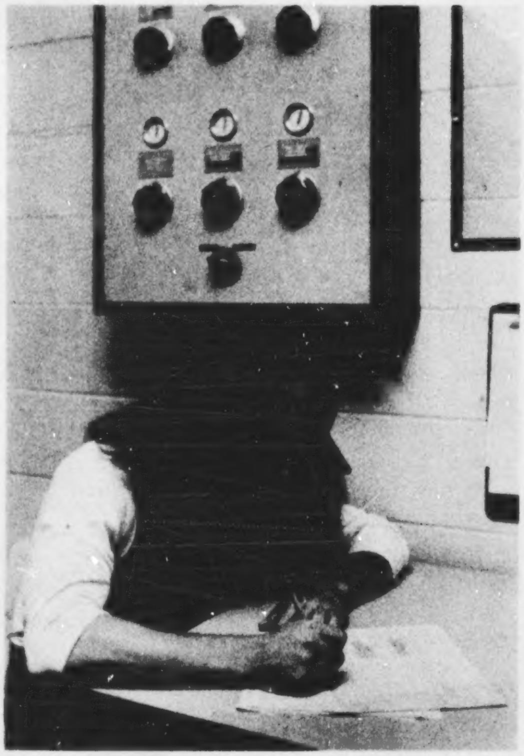
He loaded up a cart and delivered the milk to the 12 classrooms as scheduled. Just as he finished, two soft tones were heard over the intercom system. This was Harry's signal to check with Judy Howell, the school secretary, to see what he was wanted for.

"What's up?" Harry asked as he entered the office.

"Two things, Harry. First there's a cracked window in Room 16. A familiar story—kids in Physical Education class were playing softball. Also, Tom Hansen reported that someone jammed a crayon into his pencil sharpener. That's room 7," explained Judy.

"Consider everything taken care of," Harry replied.

On his way to Room 16, Harry stopped at the supply closet and picked up a piece of heavy cardboard to cover the window. Ordinarily, cardboard is not considered a "supply" but Harry found it handy to have some around for occasions like this. He grabbed a broom and dust pan in case of any shattered glass.



"The details of this job keep me pretty busy, but I still have time to do the things I enjoy most—like umpiring the kids' softball games."

After covering up the cracked window, Harry called the county maintenance service and arranged for someone to replace the window the next morning. Then he picked up a screwdriver from his tool box and headed for Tom Hansen's classroom.

"Perfect timing, Harry," said Tom. "You can try to fix the pencil sharpener while the children are at lunch."

"I'll see what I can do for you," Harry replied. He removed the pencil sharpener from the wall and then took it apart. Next, he pushed the jammed crayon through the sharpener with the tip of the screwdriver. Harry took a few paper towels from his pocket and wiped the sharpener clean. After fastening it back to the wall, Harry commented, "Should work like new now."

"Thanks for the quick service, Harry. I'll try to keep the crayons out," Tom replied.

Harry smiled and left the room. He made his way back to his desk determined to take a short rest. After all, it was 11:30 already, and with lunch period over in the next 45 minutes, he'd soon have to get out the mop and bucket to prepare for the daily cleaning of the cafeteria.

Exploring

Building service workers have to be "jacks of all trades." They need a working knowledge of many different kinds of tools and machinery.

- Are you good at fixing things?
- Are you handy with tools?
- Is it easy for you to learn how to use a tool you've never used before?
- Are you good at using and maintaining household appliances such as toasters, rug shampooers, vacuum cleaners, fans, and garden machinery?
- Do you like to take care of home repairs?
- Have you ever fixed a leaky faucet, unstopped a toilet, or replaced a fuse?
- Have you ever helped repair a bicycle, mini-bike, lawn mower, or car?

Building service workers need stamina to do such chores as mopping, sweeping, waxing, and mowing. They work both indoors and outdoors.

- Do you enjoy strenuous activities such as dancing, hiking, climbing, and skiing?

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- Do you participate in sports at school?
- Do you like to be active most of the time?

Building service workers generally set their own schedules and work on their own. They must be able to organize their time and get the job done without close supervision.

- Do you do your homework without being told to?
- Do you complete projects and book reports on time?
- Do you like to spend time by yourself?

Building service workers do many of the same chores day after day. Checking the boiler room equipment, sweeping and mopping floors, and emptying trash all are repetitive.

- Do you have a daily schedule?
- Can you put up with the repetition involved in mowing grass, shoveling snow, painting a house, or putting down tile?
- Have you ever undertaken routine tasks such as delivering newspapers or collecting from door to door?

Suggested Activities

Help with minor plumbing repairs at home. Help replace a washer in a leaky faucet. Clean out a sink trap. Your public library has books on home repairs that can guide you.

Help family and friends with automobile engine repairs. Do your own repair work for your bicycle. Mechanical work of this kind will give you practice working with small handtools.

Ask your parents to teach you to operate household appliances properly—a vacuum cleaner, rug shampooer, floor buffer, or lawn mower, for example.

Help with the gardening at home. You can assist with fertilizing and mowing the lawn, trimming trees and bushes, planting flowers and vegetables, and weeding.

Organize a cleanup campaign and pick up litter around your schoolyard or in a nearby park. This could be a class or club project.

Volunteer to repair toys at a day care center, Headstart program, or nursery school.

Offer to do minor home repairs or help winterize the homes of elderly neighbors. There may be a program of this kind in your community to which you could donate your services. To find out, call the local voluntary action center or agency on aging.

Help renovate a room or building for a teen club or community center.

Set up a schedule of the chores you do around your home each week, alloting a certain amount of time for each one. See how close your estimates come to the time it actually takes.

Interview one of the building service workers at your school about his or her job. See if you can arrange to "shadow" him or her for a morning or afternoon. Report back to your class.

Invite a representative of a commercial cleaning firm to speak to your class about his or her business. Prepare questions in advance.

If you are a Girl Scout, try for the Handywoman proficiency badge.

If you are a Boy Scout, try for the Home Repair and Plumbing merit badges.

Related Occupations

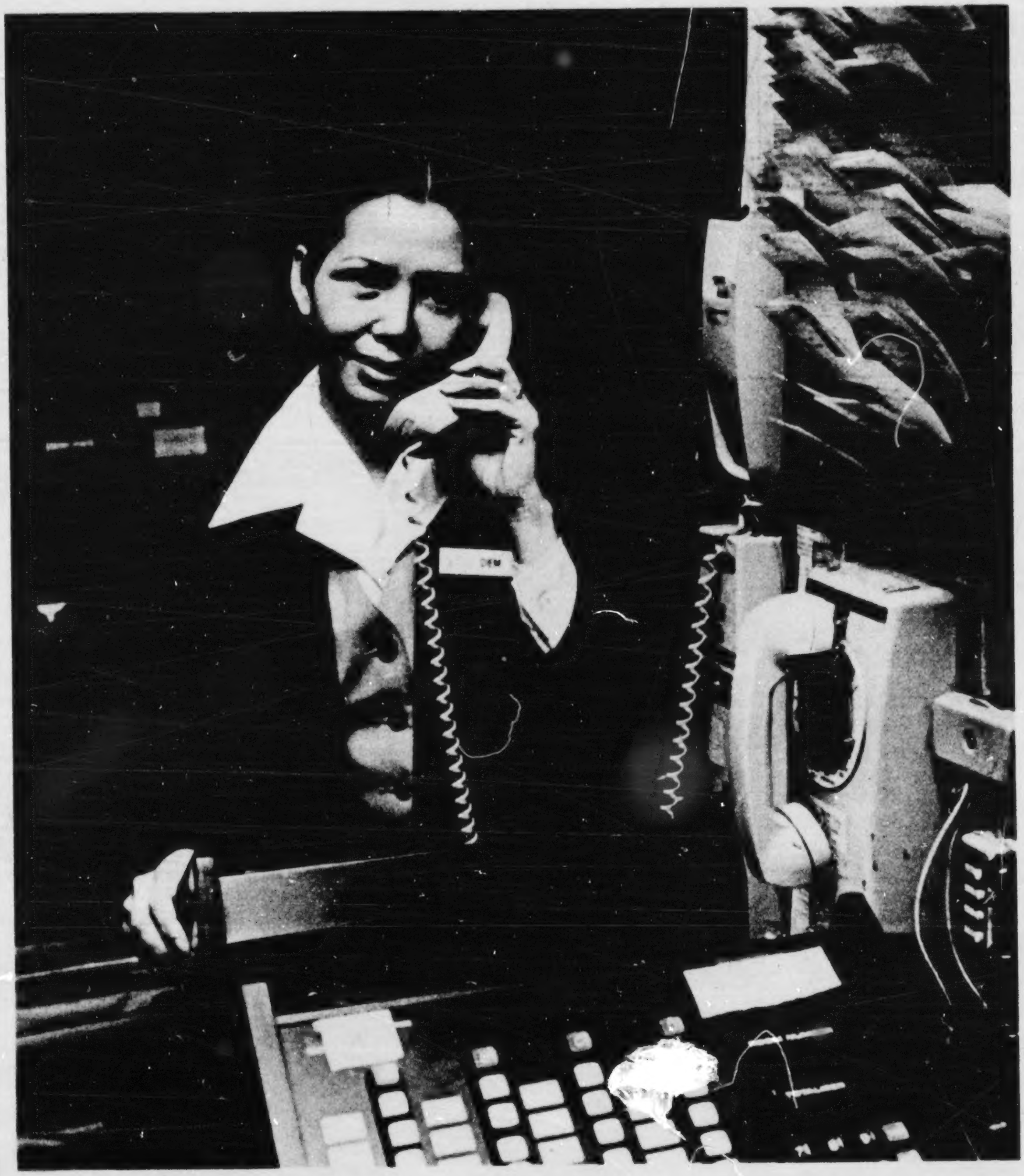
Building service workers aren't the only people who take care of buildings and the grounds around them. Unscramble the letters below to find the names of 12 other workers whose jobs involve cleaning buildings and keeping them in good repair.

1. REEPHUOKSEE
2. GRDAENRE
3. TPRIEVA HOOLDUSHE REKROW
4. LOBIRE TEDRNE
5. TNAERPI
6. SEPT COOTLRLNRE
7. NTAIEMNNCEA CTNICEAELRI
8. AHSTR LLECCOTOR
9. LOFOR WRAEX
10. NAIJTRO
11. BDINUILG SUNEDTENTPINER
12. WONDIW CLNEERA

See answers at end of chapter.

Service Occupations

Hotel Clerk



Diem Nguyen likes her job as a hotel clerk. "My ambition is to manage a hotel someday."

Diem Nguyen spotted the man as soon as he walked through the door into the crowded lobby. He looked confused and excited and clearly was impressed by so much activity. Diem knew by the way he kept staring, his face showing his amazement, that he had never stepped inside a large hotel before. Perhaps this was the first time he had visited a city as large as Boston.

The man was heading toward the counter where Diem stood. "Good morning, sir," she said to catch his attention, "and welcome to the Pilgrim Inn. May I help you?"

"Oh . . . of course, thanks a lot!" answered the man, as if awakened from a dream. "I'm with the convention."

"Which convention is that, sir?" asked Diem.

"The American Bolt Manufacturers Association," he replied. "Say, young lady, how do you clean those chandeliers way up there?"

Diem smiled in spite of herself. "We have a man who stands on a tall ladder and dusts them once a week. Now, what is your name, sir?"

"Hanks. Neal Hanks. Tell me, how many rooms are there in this hotel?"

"We have 800 rooms, Mr. Hanks," replied Diem. She flipped through the guest list for the American Bolt Manufacturers convention until she found Neal Hanks' name. "According to our list, Mr. Hanks, you requested a single room. Is that correct?"

"Eight hundred rooms! That many! Oh, yes, that's right," answered Mr. Hanks.

Diem turned to the "Roomcom" computer terminal at her left, a machine the size of a large telephone with lighted buttons and a display of lighted numbers. Punching the proper buttons, she asked Roomcom how many single rooms were vacant and made up. The lighted numbers on Roomcom told her that there were 17 such rooms. Repeatedly pressing the "advance" button would give her the numbers of all 17 rooms in order. She chose the first number, 235, and punched another button to tell Roomcom that the room was now taken.

"All right, Mr. Hanks, you'll be in room 235. Please fill out this registration card and this bill. How will you be paying for your stay?"

"With a check," answered Mr. Hanks, as he wrote his name and address on the card and the bill.

"Fine. The room is reserved for tonight and tomorrow night. If you wish to stay longer, please let us know as soon as possible. Your convention will be meeting in Conference Suite 3, one floor below the lobby. Just take the stairs there on the left or the elevator on the right. Registration began about 30 minutes ago. Around the corner here you'll find our Mayflower restaurant, open for breakfast, lunch, and dinner, as well as the Pilgrim cocktail lounge. The bellhop will show you your room. If you need anything at all, please call us. We hope you'll enjoy your stay!"

With that, Diem signaled the red-uniformed bellhop standing near the desk and handed him the room key. Picking up Mr. Hanks' suitcase, he led the way to the elevator.

Diem watched a moment as Mr. Hanks followed the bellhop, still looking excitedly in every direction. He's a rare guest, thought Diem. So easy to please. Few customers showed as much enthusiasm over the hotel as Mr. Hanks.

Turning back to work, Diem tore the name tab off Mr. Hanks' bill and placed it in the 235 slot in the room rack, a large inclined board with a color-coded slot for each room. With the rack, a room clerk can tell at a glance which rooms are occupied by which guests. Diem then placed the registration card and bill in an alphabetical file, so they could be easily found when Mr. Hanks checked out.

For a few minutes, Diem had nothing to do. She stood behind the counter with a pleasant look on her face, but her thoughts were far away. She had come to the United States from Viet Nam only 2 years ago, and life in a new country hadn't been easy. It seemed to her that too many things had changed too fast. Sometimes she longed for the home she had grown up in. Still, she was with the people she loved most! Diem lived with her parents and brothers and sisters in a small apartment in Brookline.

All of a sudden her daydreaming stopped. A young couple and two small children had appeared at the counter. "Good morning, may I help you?" asked Diem pleasantly.

"We have a reservation under the name of Stavros," answered the young man.

"One moment, please, Mr. Stavros," said Diem. Leafing through the daily computer-printed list of reservations, she came to the entry she was looking for. "George Stavros, a room with two queen-sized beds, for 3 nights. Is that correct?'

"Right. Could we have a room with a good view of the city?"

"Well, Mr. Stavros, to be honest, the best view is from the front of the hotel, and even from there you can't see much. The front rooms tend to be noisier because of street traffic. I think you might be happier with a quieter room facing the inner courtyard."

"Okay, fine," answered Mr. Stavros.

"How will you be paying for this, sir?" asked Diem.

"Can I use my National Bank Card?"

"Certainly. If you'll let me have the card, I can make up the voucher slip right now and avoid delay when you check out. Meanwhile, if you would fill out this registration card and bill . . . ."

While Mr. Stavros filled in his name and address, Diem consulted Roomcom. Room 714 fit her guests' needs. She then pulled a National Bank Card payment slip out of a drawer, placed it in the press over Mr. Stavros' card, and rolled the press over it. Later she would check his account number to be sure his credit was good. Meanwhile she would file the stamped voucher with his bill.

When Diem had finished, she handed back the credit card and explained to the Stavros family where the restaurants were. "If you need anything else, please ask," she added.

"We would like to take a bus tour of the city," said Mrs. Stavros.

"Why certainly," replied Diem, handing her two pamphlets. "This pamphlet explains what kinds of tours there are. The other pamphlet has sightseeing information and a map. I'll be happy to answer any questions you have." She then wished them a pleasant stay, signaled the bellhop, and handed him the key to room 714. Wheeling their luggage on a cart, he led the family to the elevator.

No sooner had Diem inserted the Stavros' name tab in the room rack than a tall man appeared at the counter. "I'd like a room," he said abruptly, before Diem had a chance to speak.

"Do you have a reservation?"

"No."

"Well, I'm very sorry, sir, but all our rooms are booked."

"Don't you have anything, just for one night?" he said in an argumentative tone of voice.

"I'm afraid not. This is a very busy time for us. We have two conventions that begin today and another that

"I've always enjoyed meeting and helping people," says Diem.

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is still going on. The remaining rooms were reserved in advance."

Diem could tell that the frustration on the man's face was about to turn to anger. She added quickly, "But I might be able to arrange for a room in another hotel."

The man looked surprised. "That would be nice."

Diem glanced down at the large box under the counter. The box was one of a system of terminals connecting the major hotels downtown. Each window on the face of the box had the name, address, and phone number of another hotel in the system. The lighted windows showed which hotels had vacant rooms. Today only one window was lit—the one for the Park Hotel.

Diem called the Park. Yes, they had a room for one person for one night. The man thanked her with a smile and left.

A smile like that, thought Diem, was what really made the job fun. She didn't like everything about her work. She wished she could sit down and relax once in a while instead of having to stand 8 hours a day. Sometimes the work became repetitious. And when she was working the day shift, which started at 7 a.m., she couldn't possibly sleep late. Still, the day shift was better than either of the other two. The night shift in particular got pretty boring.

Nonetheless, Diem liked the job because she loved meeting and helping people.

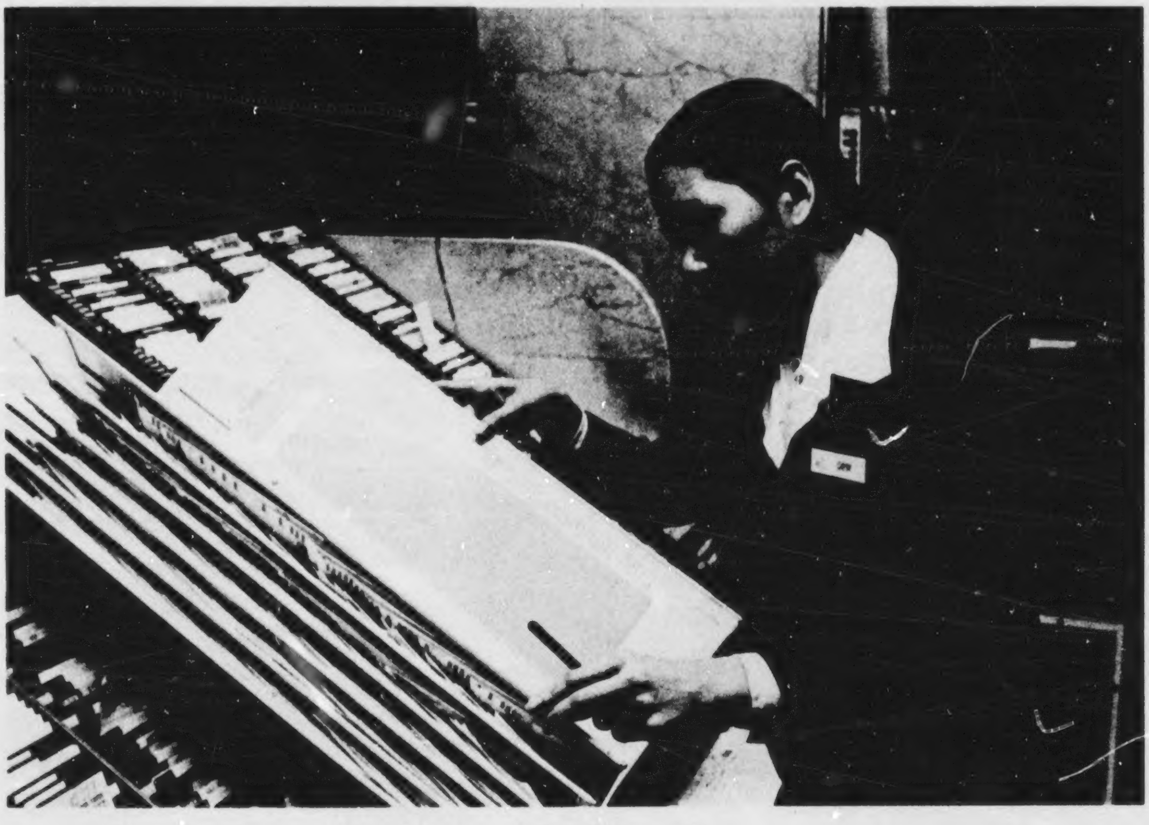
Diem was about to run a check on George Stavros' credit account when the telephone buzzed. Both her co-workers were talking to customers, so Diem picked up the phone and punched the lighted button.

"Front desk. Diem Nguyen speaking."

"Diem, this is Leslie. Could you come to my office for a moment?"

"I'll be right there," answered Diem, hanging up the receiver. Then, turning to the clerk next to her, she said, "The manager wants to see me. I'll be back in a minute."

The manager had some exciting news for Diem. She had been accepted into the management training program. United International Hotels, the company that owned the Pilgrim and other hotels across the United



Diem can tell at a glance which hotel rooms are available.

States and Europe, had an 18-month program in hotel management and only a few desk clerks were selected for it.

Diem knew she had been lucky to get a job at the Pilgrim shortly after she arrived in the United States. She had worked at the front desk for well over a year, and with management training she felt her career could really take off. The competition for management positions was stiff, but Diem would try hard. She knew that hard work was the key. She also knew that her ability to speak French would help. With a chance like this to move into a management position with an international corporation, Diem's future was looking very bright indeed.

Exploring

Room clerks deal with the public all day.

- Do you like meeting people?
- Do you start conversations with people you don't know?
- When you see people having trouble carrying a package or finding their way, do you offer to help before they ask?

Room clerks must look nice and act pleasant all the time they are working.

- Do you care about how you look?
- Do you like to wear clean, neat clothes to school?
- Are you polite and cheerful to others, even when you aren't feeling completely happy or well?

Room clerks must remain calm and helpful with angry guests.

- Can you let someone else have the last word in an argument?
- Can you accept blame for something you didn't do?
- Can you play a game by someone else's rules?

The activities of a room clerk change very little from hour to hour and day to day.

- Are you comfortable with routine activities?
- Do you have a daily schedule?
- Have you ever worked at routine jobs, such as delivering newspapers, selling candy, or collecting for charity door to door?

Room clerks must be able to remember and give directions and other detailed information.

- Can you relay messages correctly?
- Do you remember names of people and places?
- Can you give street directions clearly?

Room clerks must keep track of many things at once. They must be able to work quickly without making mistakes.

- Do you keep track of your homework assignments?
- Do you generally finish tests on time?
- Do you enjoy card games that require a good memory, such as fish, hearts, poker, or bridge?

Suggested Activities

If you live in or near a city with a large hotel, arrange a tour for your class. Ask to see the front desk and other operations, such as housekeeping, mail delivery, reservations, and food preparation. Ask questions about how the hotel is managed.

Invite a hotel clerk or manager to come to your school and talk to your class. Prepare questions in advance.

Try an activity or job in which you deal with the public. There are several to choose from. For example:
- Join a club at your school, church, or synagogue that does community service work.
- Volunteer to collect money door to door for a charity or other cause.
- Sell something door to door, such as seeds or candy.
- Get a newspaper route. (The public contact comes each month when you collect money for the newspaper.)
- Get a job selling tickets or ushering at a movie theater.

Role-play a situation in which a hotel room clerk faces several angry, upset guests. The "guests" should prepare their "complaints" beforehand. After playing the roles, discuss what happened. How well did the "clerk" handle the guests? Should he or she have done anything differently?

Write for information on careers in the hotel and motel industry to Educational Institute of the American Hotel and Motel Association, 1407 South Harrison Road, East Lansing, Michigan 48823.

Exploring Careers

Related Occupations

Many kinds of workers serve, help, or provide information to the public. Hotel room clerks are one. The names of 12 others are hidden in the array of letters below. See if you can find them. They may be forwards or backwards, horizontal or vertical.

T	R	C	U	S	T	O	M	E	R	C	O	M	P	L	A	I	N	T	C	L	E	R	K	S	A	N	N	E
O	T	O	E	I	C	A	L	B	Y	Z	E	[illegible]	N	F	O	M	A	I	A	C	X	A	M	L	I	H	A	K
U	H	S	T	N	H	R	I	E	R	N	T	I	C	K	E	Y	L	C	R	O	T	H	S	T	E	G	I	N
R	E	C	E	P	T	I	O	N	I	S	T	R	E	X	C	L	E	K	H	P	H	L	I	O	R	N	H	I
G	K	C	U	S	T	D	E	B	N	A	R	A	N	T	H	O	N	E	E	A	I	L	P	R	E	D	R	N
U	R	D	A	V	I	E	D	T	N	E	G	A	L	E	V	A	R	T	M	S	R	R	Y	O	H	W	A	F
I	E	S	A	N	D	C	V	A	N	S	C	M	V	E	S	T	O	A	R	E	T	C	U	T	S	O	M	O
D	L	G	U	I	D	U	S	P	I	N	N	E	R	J	U	D	X	G	Y	I	N	W	S	Q	U	Z	E	R
E	C	S	O	U	R	S	C	E	S	A	D	D	I	T	I	E	A	E	O	N	A	L	I	N	R	F	O	M
F	N	O	R	G	E	T	M	E	N	O	T	Z	X	U	Q	V	E	N	K	N	O	W	X	Y	E	N	A	A
H	O	E	L	L	I	O	T	S	T	N	A	D	N	E	T	T	A	T	H	G	I	L	F	Y	T	T	B	T
S	I	G	H	T	S	E	E	I	N	G	G	U	I	D	E	C	L	E	R	X	K	U	Z	O	A	U	O	I
F	T	I	C	K	F	O	R	H	E	S	A	J	O	L	Y	G	O	L	P	A	S	S	E	N	E	G	R	O
P	A	S	S	E	N	G	E	R	T	R	A	I	N	C	O	N	D	U	C	T	O	R	N	U	H	F	O	M
E	V	I	T	A	T	N	E	S	E	R	P	E	R	E	C	I	V	R	E	S	R	E	M	O	T	S	U	C
B	R	N	O	N	U	C	A	R	K	M	O	R	R	D	P	V	E	I	V	E	A	O	N	P	G	A	R	L
C	E	A	B	Y	Q	D	L	E	O	E	D	F	R	O	W	I	V	N	O	W	Z	J	E	N	N	O	L	E
E	S	N	I	B	A	S	S	E	N	G	R	O	P	E	R	O	T	M	Y	M	A	N	E	W	T	I	X	R
F	E	O	R	E	V	E	R	T	B	E	C	U	O	Z	I	L	X	R	U	S	T	B	H	I	M	M	E	K
G	R	G	U	I	D	E	Y	N	E	A	L	R	O	S	N	E	T	H	A	L	A	Y	D	D	I	T	N	M

CUSTOMER COMPLAINT CLERK

CUSTOMER SERVICE REPRESENTATIVE

FLIGHT ATTENDANT

INFORMATION CLERK

PASSENGER TRAIN CONDUCTOR

RECEPTIONIST

RESERVATION CLERK

SIGHTSEEING GUIDE

THEATER USHER

TICKET AGENT

TOUR GUIDE

TRAVEL AGENT

See answers at end of chapter.

Police Officer

Earl Hayes likes investigative work.

"Car 331. A silent burglar alarm has gone off at the Foxhall Inn. That's at 3200 Braddock Road. Over."

Before the last few words had come across the radio, Earl Hayes had his squad car's flashers and siren working, and was halfway down the street. At the same time, he picked up the microphone from the police radio and relayed, "Car 331. Over," to let the dispatcher know that he had received the call and was on his way. As he pulled up to the red light at the intersection, Earl quickly looked in all directions for oncoming traffic and then turned onto Westchester Boulevard.

A few miles down Westchester, Earl put out the flashing lights and turned off the siren. The next corner was Braddock and he didn't want to give the prowler any clues of his arrival. As he approached the Foxhall Inn, Earl saw four young men crowded around the front door, trying to peer through the curtains of the window. Even though he didn't think he'd need it, Earl grabbed his nightstick before leaving the squad car.

"Evening, gentlemen. Are you looking for someone?"

"Good evening, officer," the tallest one said. "This must look strange, but there's really a simple explanation. We are part of the Starfire Band, and we're playing here tonight. We were supposed to meet the owner here at 7:30 so that we could set up our gear and warm up. Well, we've been here over 15 minutes now, and no sign of the owner. We thought he might have arrived early and gone inside so we decided to bang on the door and see if we could get him to open up for us. But so far, no luck."

"I see, fellows," Earl replied. "Do you have any identification?"

Once again the tallest one responded. "As a matter of fact, sir, I happen to have a copy of the contract in my pocket. Here, let me show it to you."

Earl accepted the piece of paper and looked it over carefully. The contract listed the names of all the band members. Earl asked for identification from each of them to double check. Each name and address matched that on the contract. Satisfied that it was all an honest mistake, Earl explained to the group that they had set off a silent burglar alarm when they had jiggled the door. He suggested that they sit out front in their van to wait for the owner.

Earl got into the squad car and made some notes. He would need them later tonight when he wrote up his report. As he started down the street, Earl picked up the microphone from the police radio and called in to the station to "clear himself." This meant that he was ready to accept any new calls.

As he continued slowly down Braddock Road, Earl noticed a shiny red sedan that looked like it had been freshly painted. He pulled up and saw that it had out-of-state license tags. His intuition told him that this might be a stolen car and should be checked out. Earl picked up the microphone once again.

"Car 331. Please check for a 10-23 on a red sedan, Florida tags. The plate reads Adam-Frank-Zebra-seven-one-nine. Over."

The voice from the radio recited, "Car 331—that's Adam-Frank-Zebra-seven-one-nine. Over."

Earl had learned to be alert to suspicious circumstances—cars that looked out of place or vacant buildings with a light on. And he enjoyed the challenge of following up on his suspicions. His intuition was sharpened by the skills he had acquired in a criminal investigation course he had taken recently. Earl hoped to become a detective one day, and realized that the ability to conduct a thorough investigation was a "must."

Earl continued on his way, knowing that the dispatcher handling the radio calls would now feed that license tag number into a national computer network. Anytime he wanted to find out if an item was stolen or if a person was wanted by authorities elsewhere, he relayed a message to the computer, and in a matter of minutes he got a reply.

He passed through the business district and decided to check the alley behind the Oakview apartment complex, a spot where abandoned cars often were left. Tonight Earl was searching for a green 1970 station wagon, license number EWE722, that had been reported missing earlier that afternoon. Earl had found out about the missing car by reading Officer Rejonis' report. She was the officer who had been patrolling the same beat earlier that day. Earl made it a habit to skim through the reports directly after roll call.

"No luck tonight," Earl thought as he drove through the alley. He spotted some children playing catch. As he approached them, he smiled and waved. "Nice evening to be outside, isn't it?" he said as he drove slowly by.

Earl knew how important it was for a patrol officer to talk to the people on his beat—especially the children. This practice established a friendly and helpful image of police officers in the minds of the public. Being a naturally outgoing person, Earl handled this aspect of the job quite well. Also, he had taken courses in speech and psychology at the university. Earl had known then that he wanted to be a police officer; he had majored in law enforcement.

When he first joined the force, about 4 years ago, Earl had learned even more about communicating effectively. He had been taught how to phrase a question or command, how to calm a lost child, and how to get information from a badly frightened crime victim. Along with the other "rookies", Earl had taken courses on communications and public relations at the police academy. In those 6 months of full-time study, they also covered criminal law, civil law, accident investigation, self-defense, patrol techniques and safe driving, first aid, handling of firearms, and how to deal with emergencies.

Earl turned back onto the main street and heard a voice crackle over the radio, "Car 331. That's a negative on the 10–23 for the red sedan, Adam-Frank-Zebra-seven-one-nine. Over."

"331. Over," Earl replied. He glanced at his watch, noticed it was almost 8:30 p.m., and decided to head over to the Big T Diner and pick up a cup of coffee and a hamburger.

As he pulled into the parking lot of the Big T Diner, Earl spotted a car parked in the fire lane, blocking a row of legally parked cars. "Giving out traffic tickets is not my favorite job, but when it comes to glaring violations I have no choice," muttered Earl as he wrote out the ticket. Then he picked up his walkie-talkie, placed it in his belt, and walked over to the fire lane. Earl always carried his walkie-talkie with him when he left the squad car. That way, he could communicate with the station and listen for incoming calls wherever he went. He secured the ticket to the windshield of the car, then headed up the front steps of the Big T. Before he had opened the door, however, another call came in.

"Car 331. There's been a complaint by the neighbors about some noise and loud music at 9820 Britton Avenue. Over."

"Guess that coffee will have to wait," Earl thought. He picked up the walkie-talkie and replied, "331. Over."

Earl drove quickly but carefully to Britton Avenue. He didn't use his lights or siren. The sound of rock-and-roll music guided him to the correct house. In the backyard were two boys and a girl, about 14 or 15 years old, on skateboards. They had set up a large ramp and were skateboarding across the lawn and over the ramp.

"Hi. Anything wrong?" one of the boys said.

The other boy quickly broke in. "I bet it's that grouchy Mr. Benson complaining again."

Earl smiled and answered, "You're right. There was a call about the noise and the music."

With a sullen look, the boy continued, "I don't understand why Mr. Benson always ruins our good time."

"In my line of work, you need all the friends you can get."

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"The problem is that Mr. Benson's idea of a good time is a quiet summer evening," Earl lightheartedly replied. "He probably feels that you are ruining his good time." Earl thought for a moment and then continued, "Why don't you set the radio outside on the porch? That way, you can still listen to the music, but you won't have to turn it up so loud."

"Okay, but I just don't think it's fair . . ." the boy complained.

"It's not that bad, Kevin," the girl interrupted. "We can still have a good time. By the way, would you like to try a run on my skateboard, officer? It's really not as hard as it looks."

"I don't think so," Earl chuckled. As he turned to leave, he said, "Have fun, kids, but try to keep it down a bit. Even though you may think Mr. Benson is a sourpuss, he has a right to his peace and quiet."

Back in the patrol car, Earl radioed to the station to clear himself. He stretched and thought, "With a little luck, I'll be able to grab that coffee and hamburger now."

Exploring

Police officers uphold and enforce the law. They must have a deeply ingrained respect for law and order.

- Do you think it's important to obey the law even though you don't agree with it?
- Do you think it's important to be honest?
- Do you disapprove of cheating on exams or homework?
- Are you comfortable with the idea of people looking to you as an example?
- Are you conscious of your public responsibility when you are elected to the student council, chosen to be yearbook or newspaper editor, or asked to chair a club or committee?

"Most people don't intentionally violate traffic laws," says Earl. "They are just careless."

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Police officers spend much of their time educating the public about safety precautions.

- Do you obey traffic regulations when you cross a street or ride your bicycle?
- Do you have reflectors on your bicycle for riding at night?
- Do you check for oncoming traffic when you cross the street?
- Are you careful not to swim alone?
- Do you follow the instructions on the label when you use electric appliances?

Police officers must be able to think quickly and make decisions under pressure. They need excellent judgment to deal with such emergencies as a family quarrel, a highway accident, or a bank robbery.

- Could you keep calm and get help right away if your kitchen caught fire?
- Would you know what to do if an infant got hurt or stopped breathing while you were babysitting?
- Would you act sensibly if your brother or sister swallowed poison?
- Would you know what to do if a friend injured himself or herself on the playground?

Police officers must be observant in order to recount details about people and events later on.

- When you are introduced to strangers, do you remember their names?
- Can you recall identifying characteristics about your friends—birthmarks, scars, eye color, hair color, height, and weight?
- Can you tell when a car needs a tune-up?
- Do you notice minor changes in television, radio, or stereo reception?
- Do you notice it when a movie reel is changed?
- Do you enjoy identifying trees, leaves, or birds?
- Are you a collector? Do you like to collect stamps, coins, or sea shells, for example?
- Can you tell if something is missing from your room?
- Can you find a place on a road map quickly?

Police officers must be good at communicating effectively in different kinds of situations.

- Can you strike up a conversation easily?
- Can you talk to a child without talking down to him or her?
- After listening to a friend, are you good at putting his or her situation into words?
- Do you usually express yourself clearly?
- Are you good at speaking in front of a group?

Police officers must be good at giving orders, but they must be able to take orders as well.

- Are you good at supervising younger children?
- Have you ever been a camp counselor?
- Do you do what your parents or teachers ask without getting angry?
- Can you judge how far you can go when arguing with a teacher over a grade or with a class adviser over a yearbook picture?

Police officers must keep accurate records.

- Do you keep good records when you're a club treasurer or secretary?
- Do people ask you to keep score in bowling or other activities?
- Are you good at taking the minutes at a meeting?
- Are you conscientious when you take notes in class?

Police officers must be in top physical condition and have stamina to handle both emergencies and the ordinary demands of the job.

- Do you enjoy strenuous activities such as dancing, hiking, climbing, backpacking, running, jogging, swimming, and skiing?
- Do you participate in sports at school?
- Do you like being active?

Suggested Activities

Many communities have a "Ride-Along" program in which you ride with a police officer for an evening. Call your local police department and ask for the officer in charge of community relations to find out whether there is a "Ride-Along" program where you live. If not, an informal ride with an officer might be possible.

Ask your teacher to arrange a class tour of your local police department. If you are in Washington, D.C., visit the FBI.

Invite a police officer to talk to your class about his or her job. Ask the speaker to explain the training and personal qualifications needed to join the police force in your community. Prepare questions in advance.

Invite a lawyer to speak to your class about our system of criminal justice and the way it works. What is the role of the police? Lawyers? The courts? Prisons and reformatories?

What "constitutional rights" must people be informed of when they are arrested? Prepare a report on this subject for a social studies class. The school library is a good place to start. And get in touch with your local police department to see what information they can provide.

Go to court and watch a trial. Report to your social studies class on the things you observed. You might describe a lawyer examining a witness, a cross examination, a jury reporting its verdict, or a judge pronouncing a sentence.

Role-play a situation that a police officer might face—a motorist going too fast, for example, or a shopper suspected of shoplifting.

Volunteer at a halfway house or a juvenile home. You might help organize recreation and games, do tutoring, handle clerical duties, teach arts and crafts or music, or accompany a group on special trips. For more information on places in your community that need volunteers, contact your local voluntary action center.

Learn how to take fingerprints. Why is fingerprinting so important in police work?

Role-play a police artist drawing a criminal suspect from the description given by an eyewitness.

Join an Explorer Post in Law Enforcement, Emergency First Aid, Emergency Service, or Search and Rescue. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, try for merit badges in Citizenship in the Community, Emergency Preparedness, Fingerprinting, First Aid, Law, Personal Fitness, Public Speaking, and Safety.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops also may offer opportunities to try out careers through internships, service aide, and community action projects.

Write for information about a career as a police officer to the International Association of Chiefs of Police, 11 Firstfield Road, Gaithersburg, Maryland 20760.

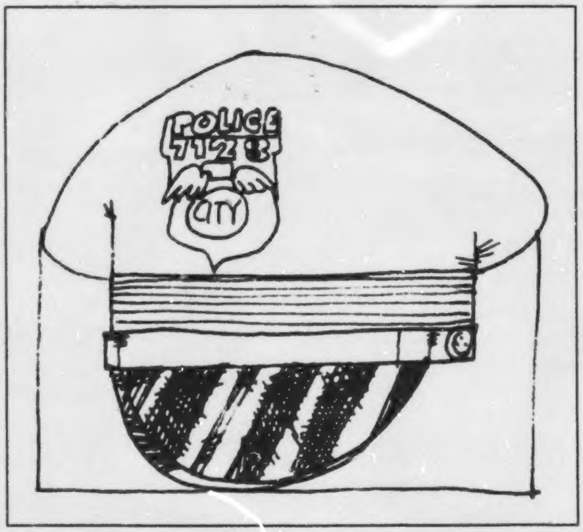
Related Occupations

Patrolling a beat is only one of the many types of jobs a police officer may have. The jobs of 10 other people concerned with law enforcement are hidden below. See if you can break the code and figure them out. You can start by using this hint:

B = A
F = E
J = I
P = O
V = U
Z = Y

1. EFUFDUJWF
2. QPMJDF QIPUPHSBQIFS
3. GCJ TQFDJBM BHFOU
4. TIFSJGG
5. QSPCBUJPO PGGJDFS
6. TUBUF QPMJDF USPPQFS
7. QPMJDF DIJFG
8. DPNNVOJUZ SFMBUJPOT PGGJDFS
9. QPMJDF BDBEFNZ JOTUSVDUPS
10. GJOHFSQSJOU TQFDJBMJTU

See answers at end of the chapter.



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Job Facts

There isn't room in this book for a story about every service occupation. However, you'll find some important facts about 27 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
CLEANING OCCUPATIONS			
Building Service Workers	These workers keep office buildings, factories, schools, hospitals, apartment buildings, and stores clean and in good condition.	Most are trained on the job. A high school diploma is not required as a rule, but workers should know simple arithmetic and read well enough to follow written instructions. High school shop courses are helpful because minor plumbing or carpentry work may be a part of the job.	Because most buildings are cleaned while they are empty, these workers often work evening hours. They spend most of their time on their feet.

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Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Pest Controllers	Professional pest controllers protect our health and property by exterminating rats, mice, and insects. Most work in major metropolitan areas for firms that specialize in this service. Jobs also are available with the government, Armed Forces, and food processors.	Beginners are trained on the job by watching and helping experienced workers. Many large firms provide classroom training too. Employers prefer trainees who are high school graduates, have safe driving records, and are in good health. Because these workers deal with customers, employers look for applicants who are courteous and well-groomed. High school courses in chemistry and business arithmetic provide a good background. Almost all States require pest controllers to pass a written test demonstrating their knowledge of pesticides.	Pest controllers work both indoors and outdoors in all kinds of weather. They often have to carry equipment and materials.
FOOD SERVICE OCCUPATIONS			
Bartenders	Bartenders serve cocktails, wine, beer, and nonalcoholic drinks. They often are asked to mix drinks to suit a customer's taste. They work in bars, restaurants, resorts, cocktail lounges, hotel and motel dining rooms, and private clubs.	Bartenders should be pleasant and look neat because they deal with the public. Generally, bartenders must be at least 21 years old. Most learn their trade on the job. Experience as a bartender's helper, dining room attendant, waiter or waitress is good training. Some private schools offer short courses in bartending that include instruction on local regulations, cocktail recipes, attire and conduct, and stocking a bar.	Bartenders often work nights or weekends. There are many part-time bartending opportunities. Some bartenders are union members.

Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Cooks and Chefs	A cook's job depends partly on the establishment he or she works in. A small restaurant, for example, usually has a limited menu and one cook prepares all of the food. Larger restaurants usually have a variety of foods on the menu, and the cooks usually specialize in one or a few dishes. Head cooks or chefs coordinate the work of the kitchen staff and direct food preparation. They often plan menus and buy food supplies. Cooks work in restaurants, cafeterias, hotel and motel dining rooms, private clubs, schools, hospitals, department stores, government agencies, and private homes.	Cooks and chefs work with people in a team relationship, and must be able to work under pressure in busy periods and in close quarters. A high school diploma is not required for most beginning jobs; it is recommended, however, for those planning a career in this field. Most cooks acquire their skills on the job while employed as kitchen helpers, although it is becoming common for cooks to have high school or post-high school training in food preparation. Occasionally they are trained in apprenticeship programs offered by professional associations and trade unions. Some large hotels and restaurants conduct employee training programs. High school courses in business arithmetic and business administration are helpful in becoming a cook or chef.	Cooks and chefs may work over 40 hours per week. They often work nights, weekends, and holidays. While on the job, cooks and chefs must stand most of the time, and may have to lift heavy pots and pans. Many cooks and chefs are union members.
Dining Room Attendants and Dishwashers	Dining room attendants clear and reset tables, carry dirty dishes from the dining area to the kitchen, and clean up spilled food and broken dishes. Dishwashers pick up where the attendants leave off—with the dirty dishes. They operate machines that clean silverware and dishes. They may scrub large pots and pans by hand. Dining room attendants and dishwashers work in restaurants, cafeterias, hotel and motel dining rooms, private clubs, schools, hospitals, and department stores.	A high school education is not needed to qualify for jobs as dining room attendants and dishwashers. Many employers will hire applicants who do not speak English. These workers should have stamina because they stand most of the time, lift and carry trays, and work at a fast pace during busy periods.	Dining room attendants and dishwashers may have to work nights, weekends, and holidays. Many part-time opportunities are available. Some of these workers belong to unions.

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Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Food Counter Workers	Food counter workers take customers' orders, serve food and beverages, write out checks, and take payments. They work in coffee shops, sandwich shops, restaurants (especially carryout or fast-food restaurants), cafeterias, and schools.	Because counter workers deal with the public, a pleasant personality and neat appearance are important. Physical stamina also is needed, as these workers stand most of the time and must work fast during busy periods. There are no set educational requirements for food counter workers. Employers often hire high school students for these jobs. Most counter workers learn their skills on the job by observing and working with those more experienced.	Many part-time opportunities are available. Flexible schedules often allow students to fit their working hours around their classes. Weekend and holiday work often is required.
Meatcutters	Meatcutters prepare meat, fish, and poultry. Their primary duty is to divide animal quarters and carcasses into steaks, roasts, chops, and other serving-sized portions. They work in food stores, meat markets, meatpacking plants, wholesale food outlets, and in large hotels and restaurants.	Manual dexterity, good depth perception, color discrimination, and good eye-hand coordination are important in cutting meat. Better-than-average strength is needed to lift heavy pieces of meat. Meatcutters usually learn their skills on the job. Some learn informally, but most are trained through apprenticeship programs. Apprenticeship generally takes 2–3 years, and consists of on-the-job training plus classroom work. After this time, apprentices must pass a test to demonstrate their expertise. A few meatcutters learn their skills by attending private schools specializing in this trade.	Meatcutters work in coldrooms designed to keep meat from spoiling. They must be careful when working with sharp tools. Most meatcutters are union members.

Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Waiters and Waitresses	Waiters and waitresses take customers' orders, serve food and beverages, write out checks, and sometimes take payments. They also may set up and clear tables and carry dirty dishes to the kitchen. They work in restaurants, cafeterias, hotel and motel dining rooms, private clubs, schools, hospitals, department stores, government agencies, and private homes.	Because waiters and waitresses are in close and constant contact with the public, a neat appearance and an even disposition are important. Physical stamina also is important, as these workers are on their feet most of the time. Most waiters and waitresses pick up their skills on the job. Some may attend special training courses offered by some public and private schools, restaurant associations, and some restaurant chains. Business arithmetic provides a helpful background, and knowledge of a foreign language may be useful in some restaurants.	Many part-time opportunities are available for waiters and waitresses. They may have to work evenings, weekends, or holidays. Some waiters and waitresses belong to unions.
HOTEL OCCUPATIONS			
Bellhops and Bell Captains	Bellhops carry baggage for hotel and motel guests and escort them to their rooms on arrival. They also may offer information or run errands for guests. Bell captains supervise bellhops. They plan work assignments, record the hours each bellhop is on duty, and train new employees. Bellhops and bell captains work in hotels and motels throughout the country.	Because bellhops have frequent contact with guests, they must be neat, tactful, and courteous. A knowledge of the local area is an asset because guests often ask about local tourist attractions, restaurants, and transportation services. Bellhops must be able to stand for long periods, carry heavy baggage, and work independently. No specific educational requirements exist for bellhops, although high school graduation improves the chances for promotion. They usually are trained on the job.	Bellhops may have to work nights, weekends, or holidays. Some bellhops are union members.
Hotel Clerks	Hotels and motels employ clerks to handle room reservations, greet guests, issue keys, and collect payments. Every hotel and motel, from the smallest out-of-the-way motor inn to the largest, fanciest red-carpet establishment, employs clerks at its front desk.	Neatness, a courteous and friendly manner, and a desire to help people are all important for clerks. In large hotels with many foreign guests, the ability to speak a foreign language may be helpful. Workers usually are trained on the job. Employers prefer high school graduates with some clerical aptitude. Often a knowledge of bookkeeping is desirable.	Large hotels usually have several clerks to perform different jobs, such as assigning rooms, keeping records, or making reservations. In small hotels and in many motels, a single clerk may do all these jobs. Some clerks are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Hotel Housekeepers and Assistants	Hotel housekeepers are responsible for keeping hotels and motels clean and attractive and providing guests with the necessary furnishings and supplies. They hire, train, and supervise the housekeeping staff. Hotel housekeepers work in hotels and motels across the country. In small or medium-sized hotels, they not only supervise the staff, but do some of the housekeeping themselves. In large hotels, their jobs are primarily administrative.	Executive housekeepers should be good at planning and organizing work, and must be able to get along well with people—especially those they supervise. Housekeepers also should like to work independently and be able to keep records. Although there are no set educational requirements, high school education usually is preferred. Experience or training in housekeeping is helpful in getting a job. Courses in housekeeping are offered by colleges with programs in hotel administration, trade schools and technical institutes, and home study (or correspondence) schools.	Many temporary positions exist in resort hotels and motels that are only open for part of the year. Hotel housekeepers may have to work shifts, including nights and weekends. Some housekeepers belong to unions.
Hotel Managers and Assistants	Hotel managers are responsible for operating their establishments profitably and for satisfying guests. They determine room rates, direct the operation of the kitchen and dining rooms, and manage the housekeeping, accounting, and maintenance departments of the hotel. These managers work in hotels and motels across the country. Over a third of all hotel and motel managers are self-employed.	Managers should have initiative, self-discipline, and the ability to organize work and direct others. They must be able to concentrate on details and solve problems. Although employers increasingly prefer college graduates, especially of hotel management programs, an applicant's work experience is the most important consideration in getting a job. Courses in hotel management are available at a number of 4-year universities, as well as many junior colleges and technical institutes throughout the country. Some large hotels have special on-the-job management trainee programs.	In small hotels and many motels, a manager's work is less specialized and may include clerical and front desk work. Some managers are union members.

Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
PERSONAL SERVICE OCCUPATIONS			
Barbers	Barbers cut and style hair to suit each customer's taste and may color or straighten hair and fit hairpieces. Most barbers offer hair and scalp treatments, shaves, facial massages, and shampoos. Most work in barbershops. Some barbers work in "unisex" salons; a few work for government agencies, in hotels, air and railroad terminals, and department stores.	Dealing with customers takes patience and a better-than-average disposition. Good health and stamina are important because barbers stand a great deal and work with both hands at shoulder level—a position that can be tiring. All States require barbers to be licensed. Generally, beginners must have graduated from a State-approved barber school, have completed the eighth grade, pass a physical exam, and be at least 16 years old. Barbering is taught in public vocational schools and in private trade schools. Programs usually include classroom study, demonstrations, and practical work.	Barbers' earnings often include tips. Most work over 40 hours per week, with lunch hours and Saturdays generally very busy. Many barbers are union members.
Cosmetologists	Cosmetologists shampoo, cut and style hair, and advise customers on how to care for their hair. They also give permanents and lighten or darken hair color. Most cosmetologists work in beauty salons. Some work in "unisex" shops, barber styling shops, or department stores. Others work in hospitals, nursing homes, and hotels.	Those who want to become cosmetologists should have finger dexterity, a sense of form and artistry, and the physical stamina to stand for long periods of time. They should enjoy dealing with the public, and be able to follow customers' instructions. All States require cosmetologists to be licensed. Generally, beginners must have graduated from an approved cosmetology school, have completed the 10th grade, pass a physical exam, and be at least 16 years old. Instruction is offered in public and private vocational schools, both in daytime and at night. Programs usually include classroom study, demonstrations, and practical work.	Cosmetologists' earnings often include tips. Most work over 40 hours per week, with lunch time and Saturdays generally very busy. Many cosmetologists are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Funeral Directors and Embalmers	Funeral directors help make the personal and business arrangements necessary for the service and burial of the deceased. Embalmers prepare the body for viewing and burial. Funeral directors and embalmers work in funeral homes, morgues, hospitals, and mortuary schools.	Important personal traits for funeral directors are composure, tact, and the ability to communicate easily with the public. They also should have the desire and ability to comfort people in their time of sorrow. A license is needed to practice embalming. Although licensing standards vary by State, an embalmer generally must be 21 years old, have a high school diploma, graduate from a mortuary science school, serve an apprenticeship, and pass the State board exam. Most States also require funeral directors to be licensed. Requirements are similar to embalmers, but directors have special apprenticeship training and board exams. Most people obtain both licenses. High school courses in biology, chemistry, and speech provide a good background for a career in this field.	In large funeral homes, employees usually have a regular schedule. Occasionally overtime or evening work may be necessary.
PRIVATE HOUSEHOLD OCCUPATIONS			
Private Household Workers	Private household workers may help care for children, clean and maintain the house and yard, and cook and serve meals. They work in private homes throughout the country.	Private household workers must have physical stamina because they are on their feet most of the time. The desire to do a job carefully and thoroughly is important. Household workers should be able to get along well with people and be able to work independently. For most household jobs, no formal education is required. Instead, the abilities to cook, sew, wash and iron, clean house, and care for children are important. Home economics courses are helpful.	Sometimes these workers live in the home of their employer. Many household workers use their skills and experience to transfer to jobs in child care or day care facilities, or take jobs as kitchen workers or building service workers.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
PROTECTIVE SERVICE OCCUPATIONS			
Correction Officers	Correction officers are responsible for the safekeeping of persons who have been arrested, are awaiting trial, or who have been tried and convicted of a crime and sentenced to serve time in a correctional institution. Their work involves maintaining order and enforcing rules in the institution, and often counseling inmates. Most of these officers work for State and local governments, often in correctional institutions in or near metropolitan areas.	Correction officers should be in good health. Most penal systems require officers to be at least 21 years old and have a high school education. In addition, many States have height, weight, vision, and hearing standards. Strength, good judgment, and the ability to think and act quickly are important. The Federal Government, as well as almost every State, provides training programs. They are generally informal and include classroom instruction as well as on-the-job experience.	Correction officers usually work a 40-hour week. Since security must be provided around the clock, some officers must work nights, weekends, and holidays.
FBI Special Agents	FBI special agents investigate violations of Federal laws in connection with bank robberies, kidnappings, white-collar crimes, thefts of government property, organized crime, espionage, and sabotage. Most agents are assigned to the FBI's 59 field offices located throughout the United States and Puerto Rico. Some work at headquarters—in Washington, D.C.	To be considered for appointment as an FBI special agent, applicants usually must be law school graduates or college graduates with an accounting degree. They must be between the ages of 23 and 35 when applying. Also, they must pass a rigid physical exam, as well as oral and written exams testing their aptitudes for meeting the public and conducting investigations.	Agents are subject to call 24 hours a day and must be available for assignment at all times. Some travel is necessary. They often work more than 40 hours per week.

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Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Firefighters	Firefighters put out fires. They also educate the public about fire prevention and check buildings for hazards. They work in municipal fire departments all over the country.	Firefighters need mental alertness, courage, endurance, mechanical aptitude, and a sense of public service. Initiative and good judgment are extremely important because firefighters often make quick decisions in emergencies. Members of crews should be dependable and able to get along well with each other. Applicants for firefighting jobs must pass a written test, a medical exam, and tests of strength, physical stamina, and agility, as specified by local regulations. They must be at least 18 years old, meet certain height and weight requirements, and have a high school education. Experience as a volunteer firefighter or training in the Armed Forces is helpful. Many fire departments have training programs for new workers. These include classroom study and practice drills.	Usually firefighters work shifts, often more than 40 hours per week. They may have to work overtime when fighting fires. Most firefighters are union members.
Guards	Guards patrol and inspect property to protect it against fire, theft, vandalism, and illegal entry. Most guards work in office buildings, government installations and buildings, stores, hotels, banks, schools, and manufacturing plants. Most jobs are located in cities and industrial areas.	Applicants should be in good health, have good character references, and good personal habits such as neatness and dependability. They should be mentally alert and emotionally stable. Most employers prefer high school graduates. Experience in the military police or in the local police department is helpful. Many employers provide on-the-job training in areas such as the use of firearms, first aid, and how to handle emergencies.	About two-thirds of all guards work at night. Often guards work alone.

Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Police Officers	Police officers enforce laws to protect citizens and property. The job can include a variety of duties including controlling traffic, investigating crime, and public relations. Officers work for local police departments in cities and towns throughout the country.	Personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important for police officers. They should enjoy working with people and serving the public. Candidates for police officers must be 21 years old, be U.S. citizens, and meet certain height and weight standards. They may have to pass a physical exam, including tests of strength and agility. Usually high school graduation is required; some areas prefer college graduates. Most police departments provide training for new workers. This includes classroom study as well as supervised work experience.	The scheduled workweek for officers usually is 40 hours and may include nights, weekends, or holidays. Officers are subject to call anytime their services are needed.
State Police Officers	State police officers patrol the highways and enforce the laws and regulations of our roads. They also provide assistance to motorists when necessary. They work for State police forces in every State except Hawaii.	Honesty, good judgment, and a sense of responsibility are all important for these officers. Often, tests of strength and agility are required. Those who want to be State police officers should be able to work independently and willing to serve the public. All officers must be U.S. citizens. Most States require applicants to be at least 21 and have a high school education. Officers must meet physical requirements, such as height, weight, and eyesight. All recruits enter a formal on-the-job training program which lasts several months.	Usually State police officers work shifts, with some on duty nights, weekends, and holidays. They are subject to emergency calls at any time.
Construction Inspectors	Federal, State, and local construction inspectors insure that recognized standards are met in all types of construction. The structures they inspect include buildings, bridges, dams, sewer systems, and streets. Over three-fourths work for municipal or county building departments.	Applicants should have a high school diploma. In addition, several years of experience as a construction contractor, supervisor, or craft worker generally are required because these workers need a thorough knowledge of construction materials and practices. Newcomers are trained on the job by working with experienced inspectors. High school courses in drafting, math, and English are helpful.	Construction inspectors often spend a large portion of time traveling between worksites. Usually an automobile is furnished for their use. They are exposed to all types of weather.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Health and Regulatory Inspectors	Health and regulatory inspectors help protect the public from health and safety hazards, and help stop unfair trade and employment practices. Nearly two-thirds work for the Federal Government, although State and local governments employ many of these inspectors.	People who want to become health and regulatory inspectors should be able to accept responsibility and like detailed work. They should be neat and be able to express themselves well orally and in writing. Because inspectors perform such a wide range of duties, the qualifications vary. Most inspectors must have experience in a field related to the area in which they will work. Often a bachelor's degree may be substituted for the experience. Specialized knowledge and skills are learned on the job in many cases.	Many inspectors travel frequently and are usually furnished with an automobile. At times working conditions may be unfavorable and hours may be long and irregular.
Occupational Safety and Health Workers	Occupational safety and health workers in a number of different occupations strive to control occupational accidents and diseases, property losses, and injuries from unsafe products. They work at a variety of jobsites, including industrial, manufacturing and commercial plants; mines; in laboratories; for property and liability insurance companies, and for goverment agencies.	Occupational safety and health workers must be able to communicate well and motivate others. They should be able to adapt quickly to different situations. In this field, a bachelor's degree in science or engineering is the minimum requirement for beginning professionals. A graduate degree in occupational safety or health is an asset. Employers attach great importance to prior work experience in the field. For jobs at the technician level, completion of a 2-year associate degree in an appropriate curriculum plus relevant work experience provide a good background.	Depending on the specific job and geographic location, travel may be required. For example, a plant safety engineer may travel only to conferences, while an insurance consultant may spend about half the time traveling between worksites.
OTHER SERVICE OCCUPATIONS			
Mail Carriers	Mail carriers travel planned routes delivering and collecting mail. They often spend a few hours at the post office each day, arranging their mail for delivery and taking care of other details. Their route may be a single office building or many miles of country roads.	Mail carriers much be at least 18 years old and pass a written exam that tests clerical accuracy, the ability to read, do simple arithmetic, and memorize mail distribution systems. They also may have to pass a driver's test, if the job involves driving. Applicants also must pass a physical exam, and may be asked to show that they can lift and handle heavy mail sacks. Carriers are trained on the job. They may begin as part-time workers, and get regular positons as openings occur.	Most carriers begin work early in the morning. They spend most of their time outdoors, in all kinds of weather. Generally, they are free to work at their own pace as long as they get the job done. Many of these workers are union members.

Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Telephone Operators	Providing service to those who need it when making phone calls is the job of telephone operators. This includes those operators who work in telephone company central offices, as well as those who work for private businesses and run private branch exchange (PBX) switchboards. More than half of all operators are employed as PBX operators in manufacturing plants, hospitals, department stores, and businesses. The remainder work for telephone companies.	Those interested in becoming telephone operators should have a clear and pleasing voice, good hearing, and not mind sitting at a switchboard for long periods. Most operators receive on-the-job training to become familiar with equipment, records, and work activities. After about 1 to 3 weeks of instruction, they are assigned to regular operator jobs. High school courses in speech, office practices, and business math provide a good background.	Operators sometimes work shifts that include evenings, weekends, or holidays. The pace may be hectic during peak periods in the late morning and late afternoons. Many telephone operators are union members.

Answers to Related Occupations

CHEF

			C	A	F	E	T	E	R	I	A	C	O	O	K			
B	R	O	I	L	E	R	C	O	O	K								
A	A		E						A									D
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					K							C	A	T	E	R	E	R

BUILDING SERVICE WORKER

1. Housekeeper, 2. Gardener, 3. Private household worker, 4. Boiler tender, 5. Painter, 6. Pest controller, 7. Maintenance electrician, 8. Trash collector, 9. Floor waxer, 10. Janitor, 11. Building superintendent, 12. Window cleaner.

POLICE OFFICER

1. Detective, 2. Police photographer, 3. FBI special agent, 4. Sheriff, 5. Probation officer, 6. State police trooper, 7. Police chief, 8. Community relations officer, 9. Police academy instructor, 10. Fingerprint specialist.

Answers to math problems

CHEF

Cookbook problem.

a. 20 lbs. meat, 20 lbs. potatoes, 50 carrots, 10 onions, 10 teaspoons salt, 10 cups vegetables.
b. To feed 60 people, you must spend $43.90.
c. With a 25 percent discount, the cost will be $32.93.

Metric measurements.

1 teaspoon butter = approximately 2.5 grams
1 tablespoon salt = approximately 7.5 grams
1 cup flour = approximately 120 grams.

HOTEL CLERK

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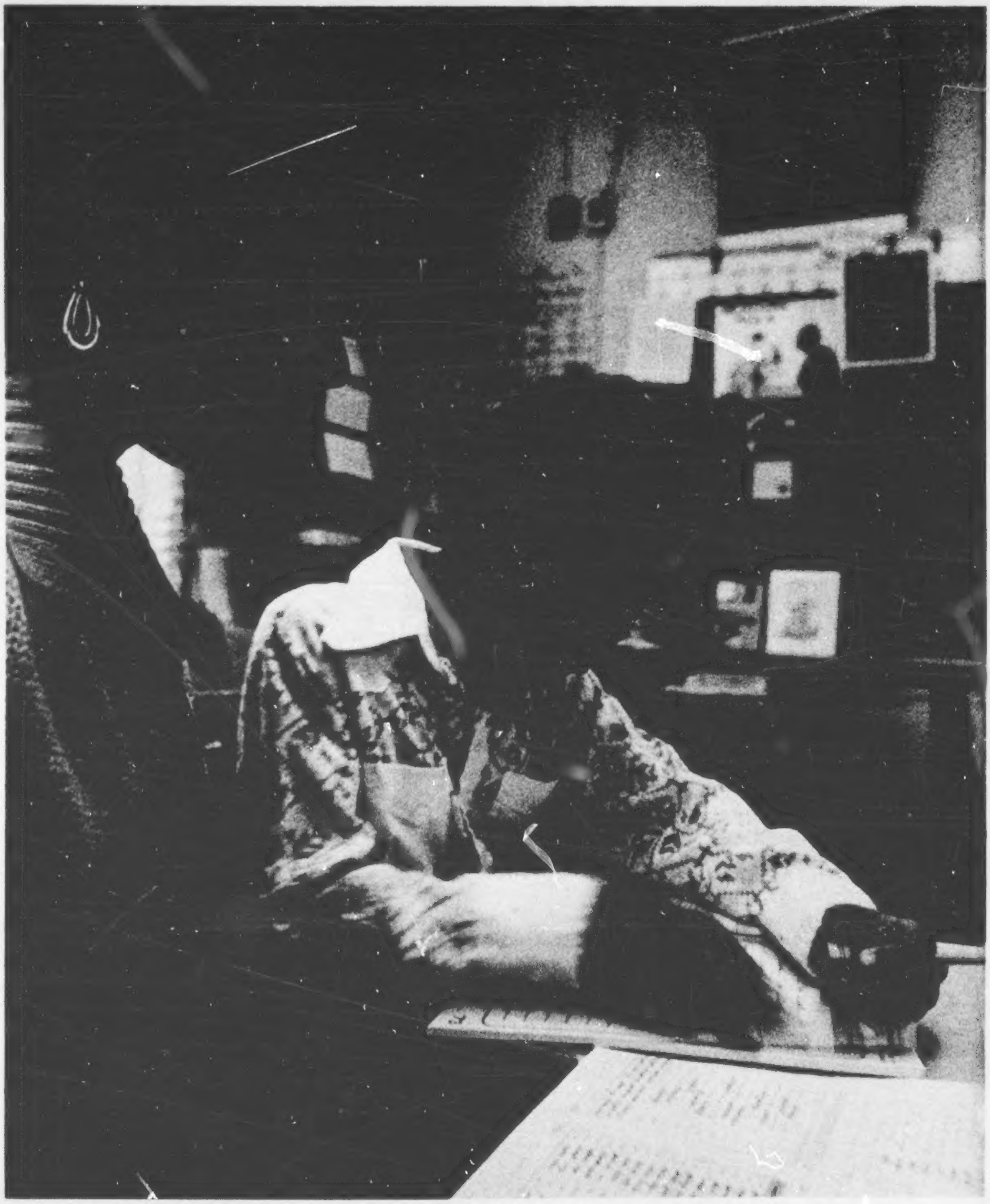
Exploring Careers

Education Occupations



Elementary school teachers help awaken their students' desire to learn.

Exploring Careers

One morning in late August or early September not so long ago you began a great adventure.

It probably started in a room that was crowded with children and adults. You might have been a bit scared. After all, you were only 5 years old and the place and the people were new to you. Still, your mother or father was with you, and you were fairly certain you could handle this new experience called school.

Your parents had told you school would be exciting. They said you would make new friends, play games, paint pictures, and learn about letters and numbers. That sounded nice. But they also said you would stay in school all morning. That did not sound nice. And they had not told you about all these strangers. So with a mixture of fear and anticipation you entered what is called the educational system.

The educational system is the world of schools and libraries, of books, films, records, and many other things to help you learn. More important, it is a world of people—teachers, counselors, administrators, and librarians—people who help others learn, explore, and grow.

You have come a long way in the educational system since that first morning. You have studied reading, writing, grammar, mathematics, science, history, art, and music. Do you think your parents were right? Is learning exciting for you? Is it exciting enough to make you want to help others learn? Have you ever thought there might be a place in education for you? Let's explore some of the possibilities.

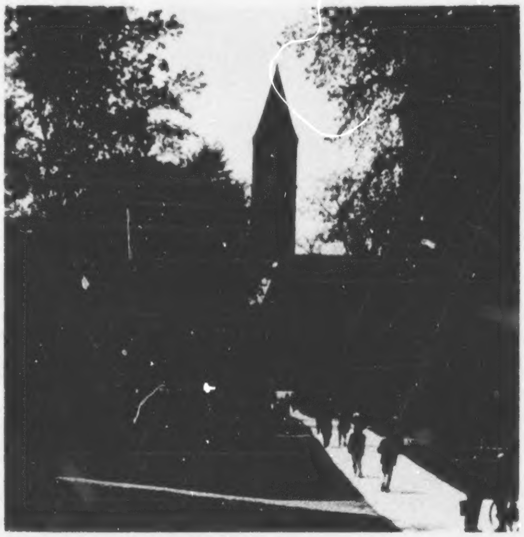
Teachers

Who helps people learn? Teachers, of course. You may think there's nothing we can tell you about teachers that you don't already know. After all, you've seen teachers "on the job" for years. You've taken part in the class discussions and demonstrations, gone on the field trips, and taken the tests. But there's more to teaching than the things that go on in the classroom.

Have you ever considered how much work teachers do "behind the scenes?" First of all, they need to know the subjects they teach. To learn enough about their subject—whether it's fingerpainting or engineering—teachers need 4 years or more of college training. Even after this, they need to keep up with their subject and with current teaching methods. They keep up by studying on their own and by taking courses and going to conferences and workshops from time to time throughout their careers.

Knowing their subjects is just the beginning. Next, teachers have to decide how to present information to a class. What ideas and facts should be emphasized? How quickly should different topics be covered? How should the students' learning be tested? As teachers plan their classes, they must consider school policy and the abilities and needs of the students.

Teachers spend time at night and during weekends preparing their class presentations and correcting exams, papers, and homework. But beyond these similarities,



All educators need a love of the world of learning

Many teachers attend summer school to study the subjects they teach.

Teachers of exceptional children need special training.

teachers' jobs vary with the age and needs of their students.

Preschool and kindergarten: Getting ready to learn. Starting school is a big step for young children. They have to get used to the daily routine. They have to learn to get along with other children. They have to develop a desire to learn. *Preschool and kindergarten teachers* help children make these adjustments.

These teachers plan and supervise activities that will help children grow socially, physically, and mentally. Singing and dancing aren't just fun. They're taught to help children get accustomed to groups and encourage them to exercise their bodies. Fingerpainting, story readings, and field trips all stimulate curiosity—a very important part of learning.

Preschool and kindergarten teachers try to keep in touch with parents and talk to them frequently. They let the parents know how their children are doing in school and on the playground.

Elementary school: Learning the basics. In the elementary grades, children start learning basic skills they will use and build on throughout their school years. Reading, writing, and arithmetic get the most attention at first. Then children start spending more of their time in school learning about the world they live in; they study science, social studies, and literature. Stimulating students' desire to learn and helping them develop good study habits also are high priorities in the elementary grades.

Elementary school teachers usually specialize in a particular age group. They plan and conduct all the classes for a certain grade, and come to know all the ins and outs of dealing with first graders, for example. Art, music, reading, and some other elementary school teachers specialize in a subject rather than an age group.

Elementary school teachers are very much interested in the personal and social growth of their students. They watch for emotional and health problems. They also try to maintain close contact with parents.

Junior high and high school: Learning in more detail. Junior high and high school students are ready for more intensive study of the subjects they take, so *secondary school teachers* are subject specialists. They teach a single subject, such as literature, industrial arts, mathematics, or business, to students on several grade levels.

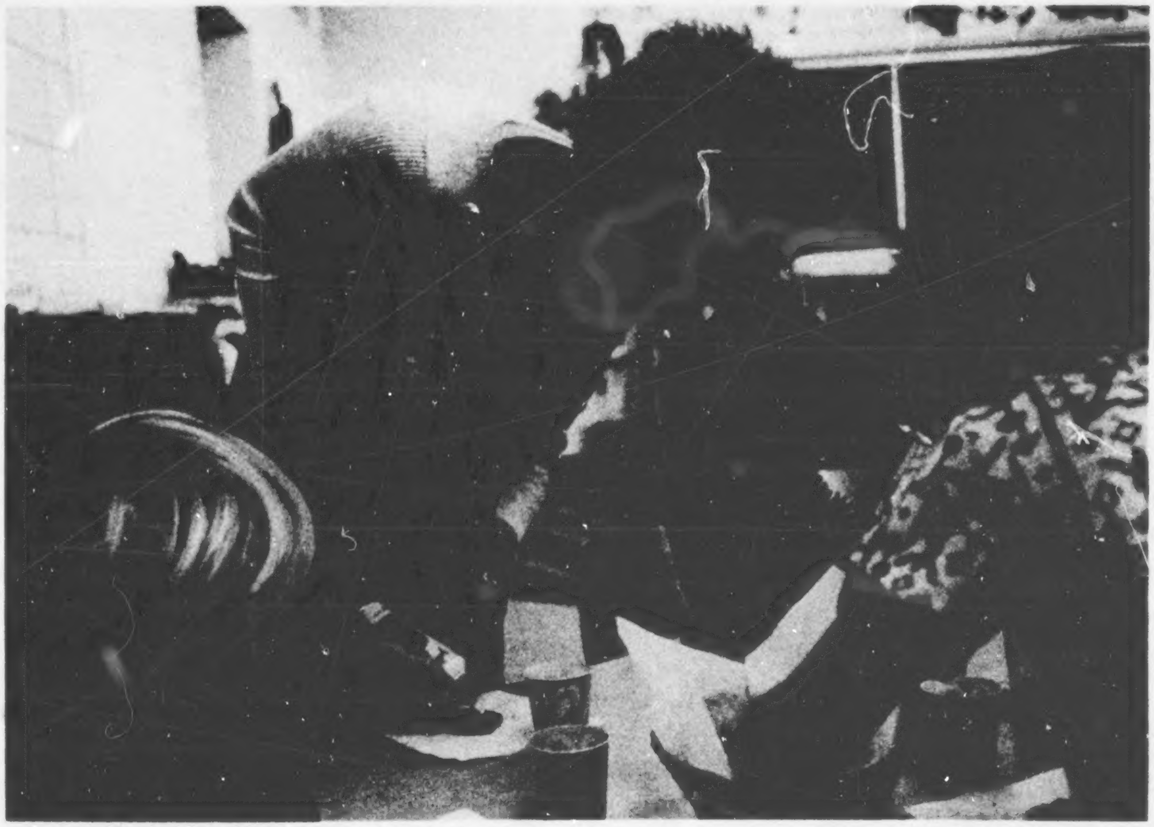
Secondary school teachers are actively concerned with students' personal development. They are expected to enforce school rules in the classroom, the cafeteria, and the halls. Secondary school teachers also have opportunities to work with students outside the classroom as advisers to school activities and clubs. These teachers, too, meet with parents to discuss students' problems and achievements.

Special teachers for special students. Some students need help in learning because they have physical handicaps or emotional problems. Special education teachers provide such help.

Some students have handicaps that prevent them from studying in regular classes. They must learn skills that will enable them to communicate more effectively. *Teachers of the deaf* show their students how to communicate through lip reading, finger spelling, and other methods. *Teachers of the visually handicapped* teach students to read and write in braille. Using these skills, deaf students and blind students can study regular elementary and secondary school subjects. These teachers also may teach subjects such as English, mathematics, or social studies.

Some special education teachers work with students who suffer from mental or emotional problems. *Teachers of the mentally retarded* help students learn basic academic and living skills. They teach subjects such as reading, writing, and arithmetic and also teach personal and job skills. *Education therapists* work with students who have nervous or emotional disorders. Besides teaching academic subjects, they watch the students for signs of problem behavior.

College: 2 years, 4 years, or more. College is where subjects are explored in depth. Students expect to learn a great deal about the subjects they study, and *college teachers* provide that in-depth analysis. Whether they are in a small junior college or a large university, college teachers must give a complete and detailed presentation



Arts and crafts stimulate curiosity—an important part of learning.

of a subject in their classes. Like high school teachers, college teachers are subject specialists, usually teaching several classes in one subject. Because college teachers are expected to be experts in their subjects, they often spend more time preparing for classes, doing research, and writing than they do teaching in a classroom or laboratory.

College teachers have many nonteaching duties. They work on faculty committees and with student organizations. They may advise students about planning their courses. However, college teachers usually do not concern themselves with their students' personal development.

Learning throughout your life. You may think that your education will end when you graduate from high school or college. However, learning is a lifelong endeavor. You're likely to go on picking up new information, mastering new skills, and broadening your horizons throughout your life. All this activity will create work for teachers.

You might, for example, decide to learn a job skill at a trade school or technical institute. Teachers in these schools instruct students in such areas as automobile mechanics, truckdriving, locksmithing, bookkeeping, cosmetology, or flying.

Or you might take courses to update or upgrade your skills after you've been working for a while. Many companies hire instructors to teach their employees to use equipment properly, to do their work safely, to manage their time more effectively, or to prepare for new responsibilities.

You might take courses for pleasure or recreation or personal fulfillment. Teachers conduct classes in art, music, religion, sports, dancing, yoga . . . just about every subject imaginable.

The reasons people want to learn are almost endless, and teachers of all kinds help them learn.

Teacher Aides

In many elementary schools, *teacher aides* help teachers with their work. Some high schools use teacher aides, too. Although the duties of teacher aides vary from school to school, their purpose is always the same: To give teachers more time to prepare for classes and work with students.

Some teacher aides do routine or clerical tasks, such as grading papers, taking attendance, or monitoring halls, lunchrooms, or school yards. In some schools, aides help by making maps, charts, or diagrams and by operating audiovisual equipment. Some aides work directly with the students. Under the supervision of a teacher, an

College professors are experts in the subjects they teach.

Dance teachers help students develop coordination and self-confidence.

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aide might help a group of children do research for a class report or help a student who has missed school catch up with homework.

Counselors

One of the toughest tasks facing students during their school years is learning about themselves. Unless students recognize and understand their own abilities, needs, and desires, they may have difficulty planning their education or finding a job. Understanding themselves also helps students deal with personal problems such as family disputes. *Counselors* in all types of schools help students learn about themselves.

Counselors use many methods to learn about students. They talk with the students individually and in groups. They meet with parents, teachers, and other school officials. They administer aptitude and other self-evaluation tests.

Using their knowledge of students, counselors can help them plan for further education, pick a career, or solve personal problems. Counselors work as part of a team. An elementary school counselor, for example, might send an emotionally troubled student to a school psychologist.

This school counselor is helping a student use a computer to explore careers.

Administrators

In many ways, schools are like businesses. Supplies must be ordered and distributed. The building and its furnishings have to be kept in good repair. Insurance policies have to be renewed. The people who work there—teachers, secretaries, janitors, and cooks—have to be hired, supervised, and paid. Schools also have some special needs. Courses have to be selected. Rules of conduct for students and faculty have to be set and enforced. The people who handle all these things so that teachers can teach, counselors can counsel, and students can learn are the school administrators.

Elementary and secondary school administration. Most elementary and secondary schools are governed by local school boards that are elected by the people of a city, town, or county. The school board delegates the day-to-day job of running the schools to a school superintendent, several supervisors and consultants, and school principals and their assistants. The *school superintendent* is the chief administrator for a school district. Superintendents are responsible for everything about the schools in their district. Superintendents prepare the budget for the school district. They plan for the construction of new schools and the closing of old schools. They make recommendations to the school board and they enforce the policies of the board. In short, superintendents run the whole show.

School districts also employ people called *supervisors* or *consultants* who are in charge of a specific subject or program for the entire school district. There might be an English supervisor, a vocational education supervisor, a career education consultant, and many others in one school district. Supervisors and consultants have many duties. They develop curriculums, visit classrooms, and set up conferences and training sessions for teachers, for example.

School principals control all the education and administrative business of a school. As a result principals have many duties. They supervise the teachers and other school employees. They must maintain good relations with the community. They must enforce the policies of the school board and the school superintendent.

To help them, principals in large schools have assistants. *Assistant principals* usually have authority in one or more areas of school administration. An assistant principal, for example, may be in charge of student discipline.

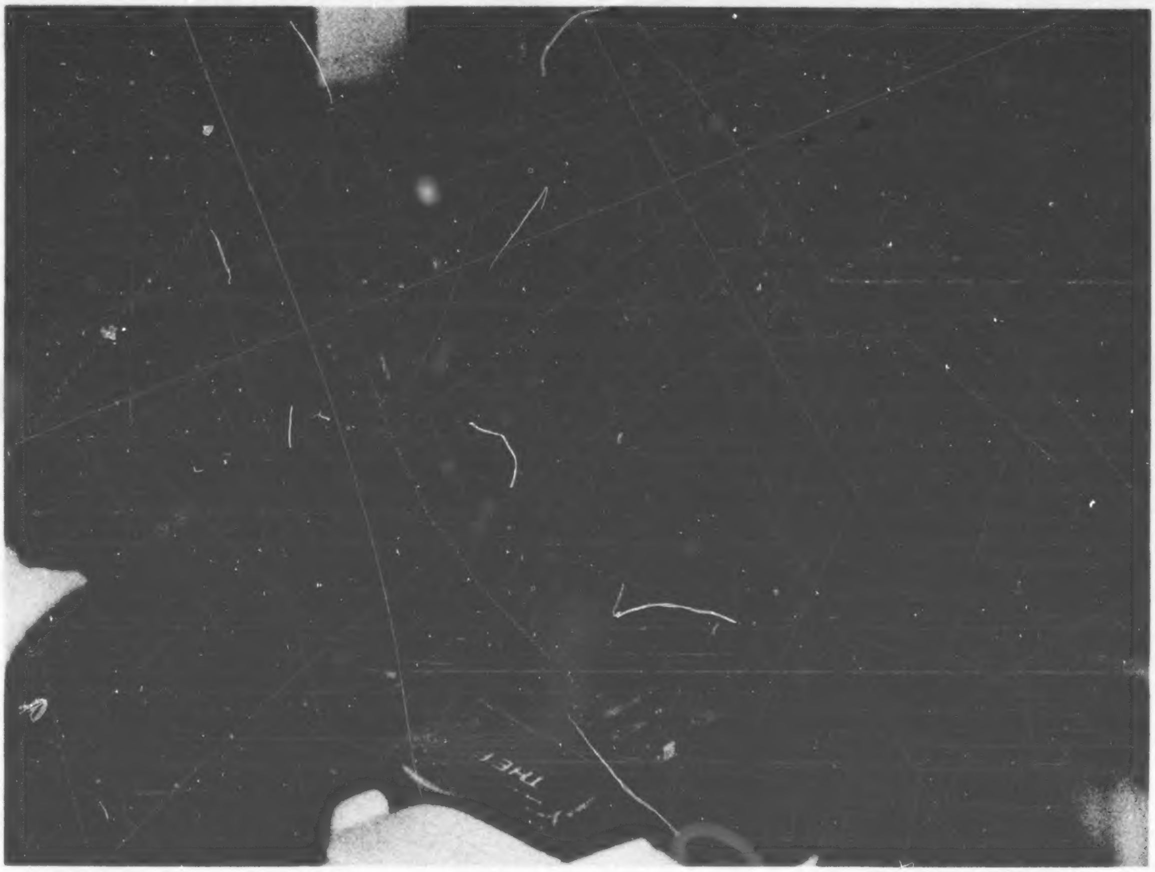
College and university administration. Colleges and universities are administered in different ways. The highest authority in many institutions of higher education is the board of trustees. This board delegates day-to-day administration of the school to the *college president* or *chancellor.* Like school district superintendents, college presidents are responsible for all aspects of the school's operation. As a result, they have many duties. Presidents oversee the preparation of the college budget. They also enforce the regulations of the school's board of trustees and recommend policies to the board. Naturally, college presidents can't do all this alone. They have the help of several other adminstrators.

The *academic dean* administers the academic policies and programs of the college. In cooperation with the faculty, the dean decides what courses the college should offer and what the academic standards for students and faculty members should be. The academic dean also coordinates the work of the *department chairpersons.* These are faculty members who administer a single department, such as English, mathematics, or chemistry.

The *dean of students* is in charge of student programs and policies. Deans formulate and enforce rules for student conduct. They also may advise students and groups about personal problems, social activities, and financial assistance.

There are a number of other administrators on college and university campuses. The *registrar* directs the college's registration activities and keeps records of students' grades. The *director of admissions* recruits students and sees that applicants meet the school's standards. The *financial aid officer* helps students obtain scholarships, grants, and loans. The *director of student affairs* plans and coordinates social and recreational activities for students.

No matter how busy he is with other things, this school principal finds time for students.



Librarians work with people—not just with books.

Librarians

Much of the information that people use to learn is contained in books, magazines, newspapers, films, tapes, and many other types of published material. Acquiring this material, organizing it, and helping other people use it is the job of librarians and their assistants.

Some librarians work behind the scenes. They handle jobs such as preparing the library budget, acquiring books and other materials, and organizing and processing them for use by readers. Three such librarians are the acquisitions librarian, the classifier, and the cataloger.

Acquisitions librarians review book catalogs and advertisements to learn what materials are available. Then they order or "acquire" them. To do their jobs well, they must know the books, magazines, or technical information that library users want.

After they have examined a new book, *classifiers* select the classification numbers and descriptive headings for it. To do this, classifiers must know the different systems used to organize library material—the Dewey Decimal system, for example. Classifiers also write out a sample card that shows the author, title, and classification number of the new acquisition.

This sample card is put to use by the *cataloger.* Catalogers prepare the cards in the card catalog that identify all the books, records, and other material in the library's collection. Catalogers also keep the cards in the catalog up to date by adding new information from time to time.

The librarians we know best work directly with the public, helping people use the library. These librarians usually are identified by the kind of library they work in or the group of peopie they work with.

Librarians generally need a master's degree.

School librarians help students and teachers use school libraries or media centers. These librarians, who sometimes are called *media specialists*, select and order the books, magazines, records, films, tapes, maps, and kits in libraries just like the one in your school. They must know the needs of the teachers and the students in the school. They let teachers and students know what materials are available. Sometimes they set up programs to encourage students and teachers to use the library. Or they conduct tours of the library and show students how to unlock some of its "secrets" by learning to use references such as the *Reader's Guide to Periodical Literature* and the card catalog.

Academic librarians work in college and university libraries. Research and reference collections are very important in these libraries, where students and professors are engaged in serious scholarship. The emphasis on research is so great that in large academic libraries even the acquisitions librarians and catalogers specialize, and handle only certain collections—Slavic books, for example.

Public librarians often specialize in helping a particular group of people. *Children's librarians*, for example, select books and have story hours for youngsters. *Young adult* and *adult librarians* provide services tailored to the interests of their readers. *Extension* or *outreach librarians* work out of bookmobiles and find other ways of bringing library services to people who cannot come to the library. *Reference librarians* help people use the many reference sources in a library. They spend a great deal of time answering questions or showing people where to find answers. In small public libraries, a librarian may handle several of these jobs. It is not unusual for a children's librarian to double as a young adult librarian, for example.

Many law firms, medical schools, government agencies, business firms, and research laboratories have their own libraries. So do historical societies, newspapers, labor unions, music publishers, movie studios, and many other kinds of organizations. The librarians who maintain and run these "special" collections are called *special librarians*. These librarians need a good background in the area that they work in. A librarian who works for a telecommunications firm, for example, may have a college degree in engineering as well as a degree in library science.

Library Clerks and Technicians

All types of librarians are helped in their work by clerks and technicians. *Clerks* do many of the routine and clerical jobs in the library, shelving books, checking in returns, and collecting fines. *Library technicians*, sometimes called library technical assistants, are more skilled than clerks and handle more responsible jobs. They may keep the card catalog up to date, operate audiovisual equipment, and answer readers' questions.

Personal Characteristics

Do you have what it takes for a career in education? What does it take, anyway? There are so many traits that are helpful that it is impossible to list them all. These are some of them.

You should have a *desire to help others* and a *sensitivity to their needs*. As an elementary school teacher you will have to spot the students who have problems with their lessons and personal development and identify the cause of the trouble. In all the teaching occupations you may spend extra time with students who have difficulty with their studies.

Patience helps. If you teach seventh grade algebra and the class cannot understand factoring after your fourth explanation, you can't give up. You simply have to try again.

You will find *tact* useful. As a school counselor, you may need to talk to parents whose child is a troublemaker in school. Unless you are tactful, the parents may not want to cooperate and everyone—the school, the student, and the parents—will suffer.

It is important to be *outgoing*. If you become a teacher, you will be on stage during every class. As a librarian, your job will be to offer assistance to frustrated researchers and confused patrons.

You should *enjoy learning* if you want a career in education. As a high school teacher much of your free time will be spent studying the subject you teach.

You should be a *good organizer*. People in teaching and library occupations often work on several projects at the same time. A high school teacher might have to keep track of five English classes plus two school clubs and serve as class adviser to boot.

A *good memory* is very valuable. As a librarian, you will read hundreds of books and then have to recall the best one for a reader who wants to learn about sailing.

Imagination is an important tool for educators. You might have to think of ways to excite students about high school physics, to lure children away from Saturday morning cartoons to come to the library, or to help high school dropouts prepare for the future.

Training

To prepare for a career in education you will spend many years as a student. For most of the occupations in this field you will need some college training. The number of years that you attend college and the subjects that you study depend on the career that you choose.

Teachers' aides and library technicians generally do not need a college education. However, the education requirements for aides and technicians vary with the amount of responsibility that their job involves. In many school districts and libraries you could be hired as an aide or library clerk directly from high school. You would learn your duties on the job. Some school districts and libraries prefer to hire teacher aides and library

Teaching often continues after the class ends.

Many college professors do research.

technicians who have attended college. Formal training for these occupations is offered by some community and junior colleges.

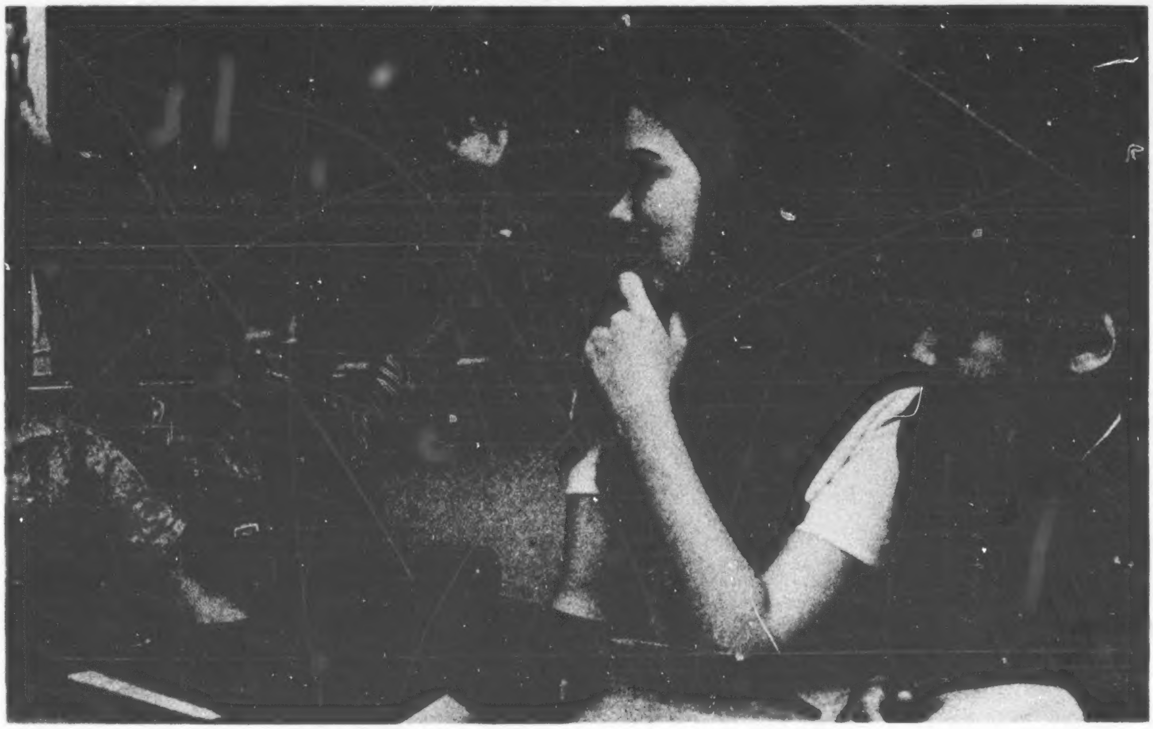
You would need a State teaching certificate—a license—to become a kindergarten, elementary, or secondary school teacher in any public school, and in a private school in many States. To qualify for the teaching certificate, you'd need a bachelor's degree from a college with a State-approved teacher education program. In college you learn about the subjects that you'll be teaching later on. You also learn methods of teaching and ways of handling students. Student teaching—teaching classes under the supervision of an experienced teacher—is a very important part of the training.

To become a school counselor or administrator you would need teaching experience and additional training. Most States require school counselors to have a teaching certificate and a counseling certificate. Depending on the State, a master's degree in counseling and up to 5 years of teaching experience are required for a counseling certificate. School administrators generally must have many years of teaching experience plus graduate study in education.

To become a librarian you would need a master's degree in library science. Where you go to library school and what you study there depend on the type of library that you wish to work in. To become a school librarian, you have to train as a librarian and also as a teacher. If you want to be a special librarian, you generally need a college degree in the subject that you intend to specialize in—chemistry or music, to give just two examples. There are special programs to train you as a law librarian or medical librarian, if that is where your interest lies.

Because college teachers must have an in-depth knowledge of their subjects, you would need at least a master's degree to enter this occupation. It usually takes 5 years or more after high school for the master's degree, then 3 or 4 more years of study for a Ph. D. Even then your study of your subject would continue. You would do research and publish books and articles.

Regardless of the occupation that you choose, you will find that your training never really ends. There always will be something new to learn. Your career in education will require a lifetime commitment to your own education.



Teacher aides encourage students to participate in class activities.

Children's Librarian

"When you've worked with children long enough, you get to know what they want," says Librarian Maggie Thompson (left).

Linda paused at the foot of the steps to the Baldwin Public Library.

"Why am I doing this?" she thought.

Linda took a deep breath and marched up the steps, through the door, and to the circulation desk.

"Excuse me," she said to the woman behind the desk. "My name is Linda Sherin. I'm from West End High School and I'm supposed to talk to Ms. Martin about working here as a volunteer aide."

At that, a tall woman walked across the room, smiled, and said, "I'm Gail Martin. I'm glad to meet you, Linda. Ms. Matthey recommended you very highly. Let's go into my office so we can talk."

The office was a small room just behind the circulation desk. After they were seated Ms. Martin said, "As you know, this interview is supposed to give you a chance to decide whether you want to work here as a volunteer page. Let me begin by telling you about the library and the job. We're not a big library, but we're very busy. There always is a lot to do. Since the staff is small, we depend on volunteers like you. You . . ."

"Excuse me," interrupted a young man from the doorway. "Gail, I'm filling out the requisition for the new film series. I need the catalog that has the ordering information."

"Sure, I have it right here," replied Ms. Martin. The man took the catalog and left.

"We show films every Wednesday night," explained Ms. Martin. "That was Tomas Reno. He's one of our library technicians. He's really marvelous. Handles all our audiovisual equipment and half a dozen other jobs.

"As I was saying, there's always a lot to do. As a page, you would shelve books, check in returns, check out books, and any one of a dozen other jobs that come up.

"According to our arrangement with your school, members of your Community Action class work from 1 o'clock to 3 o'clock on Monday, Wednesday, and Thursday afternoons. We expect you to be here on time. Actually I hope you'll like it here so much that you'll look forward to coming here. Maybe even decide to work more than 6 hours a week.

"Well, Linda, what do you say? Do you want to give us a try?"

"I guess so," said Linda hesitantly.

"But you're not sure?" asked Ms. Martin. "Linda, it's important to us that our volunteers like their work. Is something bothering you?"

"No . . well, I'm not sure I want to work here. I signed up for Community Action to get a chance to work as an aide in the hospital, or in a day care center, or even as a tutor in school. I only came here because Ms. Matthey said I should. She said you needed the most help right now. What I really want to do is work with people. You know, help them somehow."

"I see," said Ms. Martin. "And you don't think you can help people in a library."

"I guess you can, a little."

"Linda, I know we were only supposed to talk today but I'll make a deal with you. You work in the children's section for a couple of hours with Ms. Thompson. If you still don't want the job, I'll talk to Ms. Matthey. Fair enough?"

"I suppose so," Linda said uncertainly.

Ms. Martin led Linda downstairs to the children's room. It was a large room with low bookshelves lining all the walls. On top of the shelves stood large books with bright covers. The walls above the shelves were decorated with colorful posters. In the center of the room were several low tables surrounded by small chairs. On the right side of the room was a low wooden counter, piled high with stacks of books. Seated behind the counter was a woman with long red hair, intent on the piece of furry white cloth she was sewing. She was so engrossed that she didn't look up as Ms. Martin and Linda walked toward her.

"Sewing in a library? What's going on here?" thought Linda to herself, her doubts returning. She was beginning to be sorry that she had agreed to spend the afternoon here.

"Maggie," said Ms. Martin, breaking the woman's concentration, "this is Linda Sherin, a new volunteer aide. She'll work with you until 3 o'clock this afternoon."

"Fantastic," replied the woman. She smiled warmly and hurried from behind the counter, dropping her sewing in her rush.

"I'm Maggie Thompson and am I glad to see you! I have a group of first graders coming in a few minutes, so I won't even have time to give you a quick tour, but you can . . ."

"Hold on, Maggie. We don't want to scare her away on the first day," said Ms. Martin

"Okay, Gail. I'll go easy."

"I know you will," said Ms. Martin and she went upstairs.

"As I was saying, a class of first graders is coming for a tour," continued Ms. Thompson. "I like to get them in here early in their school careers. Anyway, while I handle the children, you can help me catch up with these returns."

She pointed at the books on the counter. "I wanted to take care of these this morning, but I got tied up with something else. There's always so much to do. I'm talking too much, aren't I? I do that now and again! Well, let's get you started."

Linda was a bit overwhelmed, but she dutifully followed Ms. Thompson to the counter.

Maggie shows Linda how to check in books.

Ms. Thompson showed Linda how to check in the books. The job was simple and Linda soon was working by herself. Ms. Thompson started sewing again.

With only the two of them in the room, it was very quiet. Linda soon lost interest in what she was doing.

"Boring," she thought. "I'll be glad to get out of this place."

Suddenly she heard the clatter of feet and the sound of children's voices from the stairway. In a moment a group of wide-eyed children swept into the room.

It took several minutes for their teacher to get them seated at the tables in the center of the room. During that time Ms. Thompson put down her sewing and stepped from behind the counter. She greeted the teacher and then turned to the children.

"Hello, girls and boys. How are you? My name is Maggie Thompson and I'm a librarian. Your teacher has told me how well you all read, so today I'm going to tell you about a very naughty monkey. You can read more about him in class next week. After that I'll help each of you find a book to take home."

After reading from a large, colorful picture book, Ms. Thompson took some books from the shelves and described them. She acted out scenes from the books and joked with the children. Linda marvelled at the way Ms. Thompson handled the group. She immediately got along with the children and their teacher. She was a real ham and the children loved it.

Ms. Thompson then gave a brief explanation of how to use the children's encyclopedia and the card catalog. Finally she gave the children library cards that already were filled out and showed them how to check out books. After that the children were allowed to look for books on their own. The result was bedlam, or so it seemed to Linda.

Ms. Thompson was swamped with questions. "Where can I find a book about dinosaurs?" "I want a book about space." "Can I read *The Wizard of Oz?*" "Do you have any comic books?" The librarian and the teacher helped each child select a book and check it out.

As the teacher got the children together again at the tables, Ms. Thompson went to the counter and picked

"Every time I help a child find a book, I help him or her grow a little."

up the furry cloth she had been sewing. She held it behind her back. When the children were all seated quietly, Ms. Thompson spoke to them again.

"Girls and boys, it was a pleasure to have you here. I hope you enjoy your books. Please remember to take good care of them and return them here or to your teacher in 2 weeks.

"By the way, every Saturday morning at 10 o'clock we have a story hour and I'd be happy to have you come. This Saturday is very special, because our story will be told by puppets. Right, Mr. Bird?"

From behind her back Ms. Thompson pulled a white furry hand puppet that looked like a bird.

"That's right, Ms. Thompson, and I want all these children to come and meet my friends," mouthed Ms. Thompson.

Linda was impressed by Ms. Thompson's ventriloquism. The children loved it. The children left as noisily as they had come. There was a long chorus of good-bye's and thank you's as Ms. Thompson walked them to the stairway.

"Well, that was fun," she said, returning to the counter. "How are you doing?"

"Pretty well," replied Linda, "I'll be finished soon."

"Good. I'll show you how to shelve the books when you're ready."

"Ms. Thompson, do you give tours like this often?"

"Yes, during the school year. Even though most schools have good libraries, I like to have the children come here. That way they know we have something to offer them."

"How do you know so much about the books? There are so many of them."

"I selected a lot of them," replied Ms. Thompson. "I read book reviews and browse through book stores. My husband says I spend as much time looking for books as I do with him."

"Do you read them all?"

"I try to. That way I can match books and children."

"How do you do that?"

"A little witchcraft."

"What?"

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"I'm only teasing. When you've worked with children long enough, you get to know what they want. Even if the children themselves can't explain it very clearly."

"How long have you been a librarian?"

"About 4 years. Before that, I was a budget analyst for the county government. It was a good job, but I decided I wanted a change of scene. I have a friend who is a librarian, and his work always sounded interesting. So I took a year off and went back to college for a master's degree in library science.

"I had planned to become an acquisitions librarian. That's a behind-the-scenes job. You work in an office downtown, and select books, films, magazines—whatever—for the libraries in this system. It's interesting work, but before long I realized that it would be a lot like my old job. And I wanted a big change. So I switched my specialty to children's librarianship. I'm glad I did. I've always wanted a job where I could help people. Now I have it."

"Do you really think you help people here?" Linda asked.

"Certainly," replied Ms. Thompson, astonished. "That's what the library is all about. Every time I help a child find a book I help him or her grow a little. The other day I showed a little girl how to use the encyclopedia. Now that may not seem like much to me or you, but it was tremendously exciting for her. It was as though I had given her the key to a whole new world. She sat here all morning long, just looking things up. It may seem silly, but I was excited too."

"But what's it like when the children aren't here? Don't you get bored?"

"Bored!" said Ms. Thompson, smiling. "Let me tell you what I have to try to do between now and 3 o'clock, when the children start arriving from school. I have to finish working on these puppets. Make some scenery. Set up a new display of books. Talk to Ms. Martin about my budget. Read as many book reviews as I can. Bored? There's no time for it. But we have work to do. Let me know when you're ready to shelve books."

"Um ..." Linda hesitated a moment, then asked, "Will you need any help on Saturday? With the show?"

"I can always use an extra hand, but are you sure you want to give up your Saturday morning?"

Linda thought a moment. "Yes, now I'm sure."

Exploring

Children's librarians help children use the library.

- Are you outgoing?
- Do you like to help people?
- Do you enjoy group activities such as team sports?
- Do you like to babysit or take care of your younger brothers or sisters?

Children's librarians organize story hours and other kinds of programs to interest children in reading and the library.

- Are you good at organizing parties, picnics, or school activities?
- Are you good at thinking up activities on a rainy day?
- Can you keep young children occupied when you are babysitting?
- Are you at ease leading a group?

Children's librarians answer all kinds of questions. They need to be familiar with many subjects.

- Are you curious?
- Do you have many interests in school?
- Do you have several hobbies?
- Do you have a good memory?
- Do you enjoy games that require knowledge of trivia?

Children's librarians select books, films, records, maps, and other material for the library.

- Do you like to read?
- Do you like to do book reports for your school classes?
- Do you read reviews of movies or television shows? Do you ever compare the reviewer's opinion with your own?
- Can you explain why you like or dislike a book, a movie, or a television show?
- Do you ever recommend books, movies, or records to your friends? Do they usually like your recommendations?

Children's librarians often have administrative duties such as supervising clerks and preparing a budget.

- Are you a good organizer?
- Can you handle several jobs at the same time?
- Can you give directions to other people?

Suggested Activities

Read. Use your school and public libraries to familiarize yourself with as many different subjects and styles of writing as possible.

Volunteer to work in a library. Many school and public libraries use volunteers to shelve books, work at the circulation desk, and take care of other clerical jobs. Volunteers also help with story hours, set up displays, and deliver books to people in hospitals and nursing homes.

Working with the public often is an important part of a librarian's job. To see whether this appeals to you, take advantage of opportunities to work with children.

- Take babysitting jobs.
- Offer to help with younger children at a nursery school, day care center, or summer recreational program.
- Volunteer to tutor elementary school students.

Invite a librarian to speak to your class about his or her work and training. You might invite a librarian or media specialist from your school, a librarian from your public library, or a special librarian. If possible, invite several speakers and arrange a panel discussion of the similarities and differences in librarians' jobs.

Chances are that you're already familiar with your school library and public library. To learn more about the different kinds of libraries there are, try to arrange a class tour of a special library in your community. This could be a law library, a medical library, a music library, a map library, the library of a historical society, a rare books library, or a technical library in a business firm or research organization.

Use school assignments to learn more about libraries.

- Find out what services your public library offers the handicapped, the elderly, and other groups in your community. Ask about outreach programs, talking books, large print collections, and foreign language collections, for example. Report your findings to an English or social studies class.
- Report on the origins of the public library system in the United States for an English or social studies assignment.
- Library automation could be a topic for a report in a mathematics, English, or social studies class. Find out how computers are used in libraries for ordering and processing library materials, cataloging them, keeping track of circulation records, and providing "instant" information in response to requests.

Girl Scout and Boy Scout badge programs offer a chance to learn more about such subjects as art, astronomy, child care, citizenship, electricity, languages, and writing. Being familiar with a variety of topics will help you develop the broad background that librarians need.

Role-play a meeting between a public library director and local government officials who provide the funds for the library system. Decide in advance whether the meeting is a small one, attended only by a few library and government officials, or whether it's a public meeting attended by a large number of concerned citizens. Following are examples of topics that might be discussed:

- The need for a bookmobile to provide services to people who cannot get to the library.
- Whether or not to include a particular book, on a controversial subject, in the library's collection.

Related Occupations

Is a library career for you? The work of eight librarians is described below. Try to match each description with the correct job title.

1. Alice organizes library resources in a junior high school. Besides books, she works with magazines, newspapers, charts, films, maps, records, and many other materials.

2. Bill helps researchers by preparing lists of books, magazine articles, unpublished reports, and other sources of information on a particular topic. He often includes a brief summary of the contents of each item on his list. Sometimes he uses the library's computer to get a listing of all the relevant material. Other times, he searches for titles in the card catalog.

3. George examines new library materials and classifies them according to subject matter. He decides which classification numbers and headings should go on the cards that will be put in the card catalog. Although the library where George works uses the Dewey Decimal system, he's familiar with other methods of organizing library materials as well.

4. Ed reads book reviews, publishers' announcements, and catalogs and decides which publications to order for his library. He sometimes gets ideas for new purchases from other librarians or library users.

5. Karen is the person with all the answers. If she doesn't know the answer to a patron's question, she knows where to look.

Exploring Careers

6. Lou brings his library to his readers.

7. Nancy works in a university medical center. The people who use her library need a librarian who knows the technical "language" used in the health sciences field.

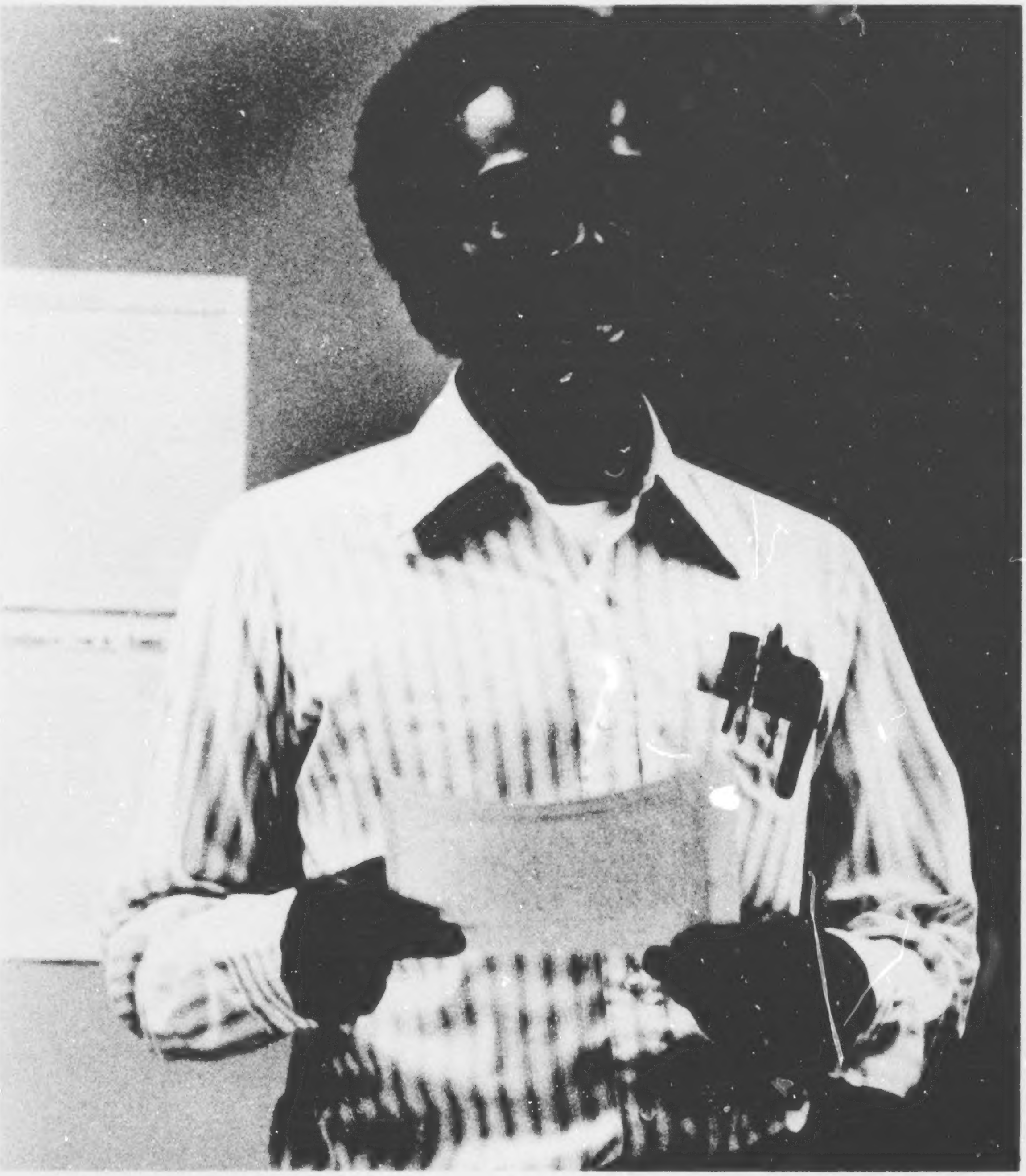
8. Sally is responsible for everything that happens in her branch library.

Acquisitions librarian
Bibliographer
Bookmobile librarian
Chief librarian
Classifier
Media specialist
Medical librarian
Reference librarian

See answers at end of chapter.

Linda needs to learn the library's classification system in order to shelve books correctly.

Secondary School Teacher



When discussion dies down in his English class, Mr. Flannery has to get things moving again.

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"Todd? . . . Todd? . . . Does anyone know if Michelle Todd is in school today?"

The clamor of voices in the classroom came to a halt. A girl called out from the back of the room, "Michelle went to see the nurse. She didn't feel well."

"Michelle never seems to feel well," thought Mr. Flannery, as he made a note beside her name. The students were beginning to talk loudly again by the time he finished taking attendance.

"They're louder than usual today," he thought. "I suppose it's the anticipation of the 4-day weekend. I'll be glad to get a few days' rest myself, even if I have to spend at least 2 days grading papers and preparing exams."

Mr. Flannery shook his head and said, "Okay, let's get down to business."

The class chatter gradually died down.

"Today we will summarize the lessons about the short story. Are there any questions about the parts of the short story?"

A room of blank faces stared up at the English teacher.

"Do you have any questions about theme . . . plot . . . characterization . . . or what they contribute to the story?"

The class remained quiet.

"Today it will be like pulling teeth," thought Mr. Flannery.

"Well, since there are no questions, I have a little surprise for you." He took a stack of papers from his briefcase.

A groan rose from the class. Several students rustled through their notebooks to find questions.

"Don't worry. I'm not giving a quiz," he said. Instantly the students relaxed.

"This sheet has some questions about the themes, plots, and characters of the stories that we read this week. We'll discuss the answers today. Pay attention because there will be a test with similar questions next Tuesday."

"Next Tuesday," groaned several students.

"Mr. Flannery, if the test is Tuesday we'll have to study over the weekend," said Earl Pickett from the front of the class. "Couldn't you postpone it? Please?"

Several students joined in the plea.

"Sorry, but the test will be Tuesday. We've fallen too far behind the other 9th grade literature class. By the way, I also want the topics for your book reports by the end of next week."

It took several minutes for the grumbling to die down. By then Mr. Flannery had finished handing out the papers.

"Okay, read the first question and write the answer. You can use your notes and books."

As the class worked, Mr. Flannery walked around the room and glanced at the students' papers. Occasionally he commented on a student's answer or gave hints to those who were stuck.

After a few minutes Mr. Flannery said, "Let's get started. Earl, what do you have for an answer?"

"Um . . . I didn't write anything. I couldn't think of an answer."

"Not a good start," thought Mr. Flannery.

"Would you read the question, Earl?"

"What is the theme of *The Cask of Amontillado* by Poe? List sections in the story to support your answer."

"Do you know what a theme is, Earl?"

"Yes, it's what the story is about."

"Right, it's the central idea in a story," said Mr. Flannery. "What happens in this story?"

"Well, this man, Montressor, leads another man, um . . . Fortunato, into a wine cellar, chains him to a wall and buries him in with stone," replied Earl.

"Very good. Why did Montressor do this?"

"Because Fortunato insulted him and Montressor wanted to get even."

"In other words Montressor wanted revenge."

"Right," replied Earl.

"Not bad," thought Mr. Flannery. "Earl usually doesn't read the assignments that carefully. I'd better involve some of the others before they fall asleep."

"Betty, what did you think the theme of the story was?"

"I said the story was about revenge."

"What about revenge?" Mr. Flannery asked the class. "Is the author saying something about revenge? Ron, what do you think?"

"I think the story says you can't really get revenge."

"Very good. Why do . . . "

"I don't understand," interrupted Earl. "Montressor got revenge. He killed Fortunato."

"Amazing," thought Mr. Flannery. "This is the first time Earl's been interested in a class discussion."

"Okay, Earl. Montressor does kill Fortunato, but does he really get the revenge that he wants?"

"Sure he does."

"Let's take a closer look," said Mr. Flannery. "In the first paragraph in the story, Montressor says there are two conditions for successful revenge. What are they?"

The students leafed through their books.

"This is great," thought Mr. Flannery. "They're really interested."

"He says the person has to know that he's being punished," called out Jim Riley.

"Very good. What else?"

"Montressor says that he has to punish with impunity," volunteered Steve Muir.

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"What does that mean?" asked Mr. Flannery.

"He doesn't want to get caught," said Earl.

"Good. Does Montressor's revenge meet the conditions that he sets?"

"Sure," replied Earl. "Fortunato knows he's being punished and Montressor isn't caught."

"Isn't he?" quizzed Mr. Flannery.

Earl said hesitantly, "It says the body lay undisturbed for 50 years."

"True," said Mr. Flannery. "But doesn't it seem odd that after 50 years Montressor still remembers so many details of his crime? The last line is "In pace requiescat." What does that mean?" continued Mr. Flannery.

"May he rest in peace," replied Earl.

"Right. Why would Montressor wish that for his enemy?"

"Maybe he didn't think Fortunato was resting in peace," replied Jim.

"Yes, maybe Fortunato's ghost was haunting him," said Ron.

"They're getting it," thought Mr. Flannery. "Very good. What else does Montressor say after Fortunato's death that makes you think he was punished?"

The class was silent for a few moments, then Betty said, "He said his heart grew sick."

"Right. Now let's examine what we have said. Montressor wants revenge. Moreover, he wants it with impunity—that is, without being punished himself. At the end of the story Montressor says he is sick at heart, and indicates that the crime and the memory of Fortunato still bother him after 50 years."

"Okay, Earl," Mr. Flannery thought to himself. "I know you have it. Don't let me down." The teacher stepped right next to Earl and looked directly at him.

"Earl, now can you explain the story's theme—that it is impossible to get revenge?"

"No."

Mr. Flannery almost staggered back a step. He felt crushed by Earl's answer. "Oh, Earl, I was sure you had it," he thought.

"I wish I had more time to help each student."

After a moment Mr. Flannery said slowly, "Okay, I'll explain. Montressor doesn't get the revenge that he wants because he feels guilty. Even though he's not caught, he's punished by his conscience."

"Oh, I see," said Earl quickly. Mr. Flannery wasn't sure that Earl really understood.

"Try the next question," he said.

As the class worked on the second question, Mr. Flannery leaned against his desk. He noticed some students talking instead of working. As he was about to correct them, the classroom door swung open and Michelle Todd walked in.

"Mr. Flannery, the nurse said I can go home, but you have to sign this note," said Michelle very loudly. Several students looked up from their work.

"Michelle, please be quiet. You're disturbing the class," said Mr. Flannery. "What's the matter?"

"I don't know," the girl replied. "I just don't feel well."

"Michelle, this is the third time that you've left early this month. You know your grades . . . ."

"I can't help it if I'm sick," said Michelle even more loudly. Several students giggled.

"I guess not," said Mr. Flannery. "Here's the note." Michelle left the room and slammed the door behind her. The class looked up, startled.

"Back to work," snapped Mr. Flannery.

"Calm down, Flannery. You're not a miracle worker. You can't work with some kids," he thought.

Mr. Flannery kept the discussion going, but the class had lost its enthusiasm. Most of the students closed their books and were ready to leave long before the bell rang.

When it did ring, the students rushed out the door. Mr. Flannery dropped into his chair. He was ready for a break. After a few minutes Mr. Flannery took a small notebook from his briefcase and checked his schedule for the day.

9:20—9th grade literature, first section
10:05—Work on term papers.
10:50—10th grade literature, third section.
11:35—Lunch patrol.

"I don't need that today," he thought. "I'd really prefer to eat with adults today or better yet alone."

12:30—9th grade literature, second section.
1:45—10th grade literature, first section.
2:30—12th grade writing course.
3:15—Talk to principal about cheerleader uniforms.
5:00—Pictures of basketball game for yearbook.

"Teaching has its headaches, but I can't see myself in any other line of work."

"And then I get to go to my class at night school. Maybe I shouldn't have taken a course this semester. Monitoring the cheerleaders and the yearbook take up enough of my free time. But Professor Walton's class on classical themes in modern drama was too tempting to pass up. Besides, going to school at night is no tougher now than it was 5 years ago when I was taking the graduate courses I needed for my permanent certification.

"Five years of teaching," he mused. "With all the headaches it sometimes feels like 50. But I can't see myself in any other line of work. I wonder why."

"Mr. Flannery," Earl stood in the doorway.

"Earl, what's up?"

"I wanted to know if I could do my book report on another one of Poe's stories," said Earl. "I really liked *The Cask* and your explanation of it. I'd like to read some other stuff of Poe's."

"That will be fine," said Mr. Flannery. Earl left the room.

"Well, I guess that's one reason why."

Education Occupations

Exploring

Secondary school teachers help students learn.

- Do you like to help other people learn?
- Do you help your classmates with their school work?
- Do you like to help young children learn their letters and numbers?

Secondary school teachers learn as well as teach. They must know a great deal about their subjects and keep up with new information and ideas.

- Do you enjoy learning?
- When you are curious about something, do you go to an encyclopedia or library to learn more about it?
- Can you learn on your own? Can you read a book and pick out the important ideas?
- Is there a subject that you especially enjoy studying?

Secondary school teachers must be able to command the attention of a group.

- Are you good at making class presentations?
- Is it easy for you to speak up at meetings or in groups?
- Do friends ever ask you to be the spokesperson for a group?

Secondary school teachers work with people—students, parents, faculty, and school administrators.

- Do you like to work with people?
- Are you active in school clubs or committees?
- Do you enjoy working with others on class projects?
- Do you like team sports?
- Are you patient?
- Are you tactful?
- Are you diplomatic when people don't go along with your ideas?

Secondary school teachers often have nonteaching duties. They monitor lunchrooms and serve as advisers for student activities.

- Are you a good organizer?
- Can you handle several jobs at one time?
- Do you participate in extracurricular activities in school?
- Are you good at directing the work of other people?

Secondary school teachers often work in the evenings and during weekends.

- Do you think you would be willing to work at night or on weekends?

Suggested Activities

Get involved in activities that give you an opportunity to develop teaching and leadership skills. Volunteer to tutor your classmates or younger students in a subject that interests you. Volunteer to help with children at a Head Start program, day care center, or nursery. Offer to direct children in arts and crafts, music, or sports in a summer recreation program. Participate in extracurricular activities in which you work with other students, such as school clubs, the school paper, or the school yearbook.

Talk to several secondary school teachers about their jobs. Find out why they became teachers, how they feel about the subject they teach, how they feel about the students, and what they like and dislike about teaching. Ask elementary school teachers the same questions and compare answers.

If you know the subject you would like to teach, talk to the teacher who teaches it in your school. Find out why he or she teaches that subject. Ask for a list of books you could read to learn more about the subject.

Use school assignments to learn more about teaching.

- Prepare a report on the growth of public education in the United States for a history class.
- Prepare a report on current issues in education for an English or social studies class.
- Prepare a report on the use of computers in education for a science class.

Join an Education or Teaching Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book and ask for the "Explorer Division."

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges.

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Exploring Careers

Teachers deal with many people in many different situations. Role-play the following situations to get a better idea of the teacher's point of view.

- A teacher correcting a student who continually disrupts class.
- A teacher explaining to a student's parents why the student failed the course.
- A teacher discussing a new course with the school principal.

Write for career information to American Federation of Teachers, 11 Dupont Circle, N.W., Washington, D.C. 20036.

Related Occupations

How many kinds of teachers are there? You probably can name quite a few just from the teachers in your school—athletic coach, biology teacher, history teacher, typing teacher, and more. If you add the elementary school, college, and adult education teachers that you know about, the list becomes even longer. But your list still would include only some of the occupations in teaching. For every subject people want to learn, there is some type of teacher.

The scrambled letters below contain the names of fourteen teachers. Each teaches a subject that is important in one of the fourteen occupational clusters in *Exploring Careers*. First unscramble the letters to find the job title. Then match the job with the right occupational cluster.

1. TRIALDUSIN STAR ERTEAHC
2. GNIOOCK ERTEAHC
3. RARYLIB SECNCEI ERTEAHC
4. WLA FESSORPOR
5. DELMOING CHAETER
6. NILGYF ROICSUNTRT
7. GINGINENEER CHAETER
8. HCTAWMAKNIG CHAETER
9. SINGRUN AHCRETE
10. ONOCEMICS AHCRETE
11. EHOM ONOCEMICS AHCRETE
12. TAR ETEAHCR
13. ROFTESYR ETEAHCR
14. PHOS TMAH ETEAHCR

Occupational Clusters

Agriculture, Forestry, and Fishery Occupations
Construction Occupations
Education Occupations
Health Occupations
Industrial Production Occupations
Mechanics and Repairers
Office Occupations
Sales Occupations
Performing Arts, Design, and Communications Occupations
Scientific and Technical Occupations
Service Occupations
Social Scientists
Social Service Occupations
Transportation Occupations

See answers at end of chapter.

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School Counselor

Jean Matthey feels that the best part of her job is helping students understand themselves.

Jean Matthey took one last sip of coffee before leaving the faculty lounge.

"I hope no one bothers me this first hour," she thought as she opened the door to her office. "I need some time to catch up on my paperwork."

"No such luck," she said out loud as she spotted the note on her desk. It was from Ms. Thornton, the school principal: "Jean, please see me as soon as possible."

Ms. Thornton was looking over some budget figures for the school board when Jean entered the office.

"You wanted to see me?" asked Jean.

"Oh, yes. Won't keep you a minute," replied Ms. Thornton. "It's about Michelle Todd. She's been out of school a lot recently, as you know."

"Yes," agreed Jean. "Doesn't she have tonsilitis?"

"We thought so. But yesterday, while Mr. Flannery was at the mall arranging exhibition space for the cheerleader tryouts, he saw Michelle. And in the middle of the morning!"

"Have you notified the truant officer?" Jean inquired.

"No, not yet. I think you'd be well advised to have a talk with Mrs. Todd before we contact the truant officer. A little straight talk from the school counselor might be sufficient."

"Have you made an appointment with Mrs. Todd?" Jean asked.

"Yes, she's coming today at 1:30, during your free hour. Do you think you can handle this problem for me? The situation is rather delicate since Mrs. Todd continually writes notes to excuse her absences."

"I see what you mean," said Jean hesitantly. "I'll try to be diplomatic. I'm certainly glad to have this chance to get to the root of the problem without involving the truant officer. I'll keep you posted."

"Thank you, Jean."

As she headed for her office, Jean suddenly remembered her morning appointment with Julie Cauldwell. Her step quickened.

"Hi, Jean." It was Mr. Flannery.

"Oh, hello, Jim. Say, why do you suppose Michelle Todd is missing so much school lately?"

"I don't really know, Jean. It's all the more surprising when you consider she was one of my best students a month ago. Now I can't even get her to sit through an entire class period. I've tried talking to her but she seems very uptight. Some kids . . . you know how hard it can be to get through to . . . ."

"Thanks for the information, Jim," said Jean, interrupting the English teacher in mid-sentence. "I'm late for an appointment so I've got to go," she apologized.

"Sure, Jean. See you later."

"Jim really is a good teacher," she thought to herself. "He tries to reach out to all of his students, but he doesn't always have the time to get to the root of their problems. But that's why I'm here, after all."

She had a fleeting thought of herself as a teacher 3 years ago. She had been spending so much time helping her students with their courses and concerns that she decided to train to become a counselor. Two years back at the university in a master's program in counseling and then—Middlesex Junior High. "I'm really glad I made the change," thought Jean proudly. "This is more for me . . ."

"Good morning, Julie," the counselor said to the youngster quietly waiting in her office. "Did you look over the list of organizations that are cooperating in our work-study program?"

"No, ma'am. I lost my copy. But I already know where I want to work. Would you sign me up for The Crazy Horse Boutique?"

"Gladly, Julie. I didn't realize that you were interested in fashion retailing," said Jean cheerfully.

"I'm not. I mean, I'm sort of interested in it. But mostly I want to work there because Mary Simmons is."

"Oh," said Jean softly. "Listen, Julie, why don't we go over the list once more. Perhaps we'll come across something you are particularly interested in and . . . ."

"No, thanks, Ms. Matthey. Just sign me up for The Crazy Horse. I've got to be going since I have to meet Mary . . . ."

"O.K., Julie. The Crazy Horse it is."

As Jean watched the girl leave, she suddenly began thinking about herself at 14. Pamela Glenn had been her best friend in ninth grade. Inseparable! Or so everyone had said . . . . The phone rang as Jean was trying with some difficulty to remember the last time she and Pam had seen each other. The call jarred her from her thoughts.

"Hello, Jean? Jean, are you there?"

"Liz, you sound panicked. What can I do for you?"

"I am in a panic," replied Liz emphatically. Liz Swoyer taught drama at Middlesex Junior High. "Rudy Kowalski, my student stage manager, is moving with his family to Cincinnati," she continued in an agitated voice. "We were about to begin rehearsing for our second production, My Fair Lady, but without a stage manager, we are at a standstill. Do you know a hard-working student with leadership ability and organizational skills? I only have a few days to train him or her so we must find someone quickly!"

"Let me think about it," said Jean. "Can I get back to you tomorrow morning?"

"Sure, Jean. I'll be waiting to hear from you. Goodbye."

After hanging up the phone, Jean began flipping through her student activity card file.

"Hmm . . . Let's see, Mark Feingold? No, he's too busy with football. Susan Vetter? No. she has soccer practice every day after school. Hmm . . . Maybe Barbara Shapley. No, her grades are slipping as it is now. Maybe Phil Caron . . . ."

After lunch Jean walked to her office to meet Mrs. Todd. The woman's face showed her concern. She was nervously flipping through a magazine. As Jean approached, she felt a surge of compassion.

"Hello, Mrs. Todd. I'm Jean Matthey, the school counselor. I'd like to talk to you about Michelle. Lately she hasn't . . ."

"I know," interrupted Mrs. Todd. "She hasn't been coming to school. I'm partly to blame, you know, because I allow her to stay home. She has not wanted to come to school this past month. And she has been so sad lately I haven't had the heart to force her to go."

"She's been sad?" inquired Jean softly.

"Well, yes. You see, for months she practiced her speech for the debate team tryouts. I used to find her 3x5 cards all over the house. She's never worked so hard for anything in her life!"

"And did she make the team, Mrs. Todd?"

"No, she was rejected in the first round." Mrs. Todd's eyes misted over. "It broke my heart to see it. This age is difficult enough without this kind of rejection. I don't see why everyone can't be accepted. Do you? Can you do anything to help, Ms. Matthey?"

Jean was deep in thought. "Actually, Mrs. Todd, I do think I can help Michelle recover from her disappointment. Is she home now?"

"Why yes, I suppose so. What do you have in mind?"

"I would prefer talking to Michelle about it first, if you don't mind."

"Oh, not at all, Ms. Matthey. If you could do anything to help boost her spirits, I'd appreciate it very much."

"I'll do what I can, Mrs. Todd. I'll give you a call after I've talked to Michelle."

"Fine. Thank you so much, Ms. Matthey."

Jean felt exhilarated. Every now and then things seemed to click.

She dialed the Todds' number.

"Hello?"

"Hello, Michelle. This is Ms. Matthey. I was wondering if you would come to school an hour early tomorrow morning to meet with Ms. Swoyer, the drama teacher . . . "

Jean likes talking with parents. "They help make counseling work."

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Exploring Careers

Exploring

School counselors help students talk about their personal and social concerns. They must have an understanding of human emotions and behavior.

- Are you interested in knowing what causes people to respond as they do to an advertisement, a public appearance by a rock star, or a disaster?
- Are you able to forget about your problems in order to concentrate on those of a friend?
- Do you respond compassionately when a friend is upset, even though you feel he or she is overreacting?
- Are you able to comfort a younger brother or sister when his or her feelings have been hurt?
- Can you comfort a parent when he or she is upset?
- Can you tell when someone's feelings have been hurt even though he or she is trying to conceal it?

School counselors must be able to establish warm relationships with others. This encourages people to express their true feelings and, ultimately, to grow.

- Are you able to make guests feel welcome?
- Are you good at introducing people to one another at a party?
- Are you friendly with newcomers in your school or neighborhood?
- Do your friends confide in you?
- Are you able to criticize others in a way that doesn't hurt their feelings?
- Are you good at dealing with someone who constantly interrupts or never gets to the point?
- Are you patient in listening to someone else's troubles even though you hear the same thing over and over again?
- Do you become annoyed if a friend doesn't follow your advice even though he or she asked for it?

"I often see myself in the teenagers I counsel. I had many of the same problems."

Education Occupations

School counselors must believe that a person can succeed if he or she really tries. They must remain supportive during trying times in the lives of individuals.

- Are you an optimistic, up-beat sort of person?
- Do friends come to you when they are sad?
- Can you talk someone into a good mood?
- Do you get excited about little things?
- Are you good at boosting a friend's confidence when he or she is nervous about an exam, a tryout, or asking someone for a date?
- Would you be good at coaching a team?

School counselors don't always see the results of their work right away. They must remain supportive and hopeful even though progress is slow.

- Do you appreciate small gains or progress?
- Do you have the patience to grow a garden?
- Are you able to stick with a diet or exercise program?

School counselors assist students with education and career planning.

- Are you good at planning ahead for things?
- Are you aware of the curriculum choices that you'll be asked to make in high school?
- Do you know which high school courses you'd need to be accepted for college, vocational school, or apprenticeship training?

School counselors must administer the school guidance program. They must be good at organizing work and getting along with people.

- Are you able to organize your time?
- Are you able to carry out a study plan?
- Are you a good leader? Do other people go along with your ideas when you're in charge of a group?
- Do you like to coordinate cookie sales, calendar sales, greeting card sales, or other fund-raising projects?
- Do you like to organize trips or parties?

School counselors must "sell" the guidance program to school faculty as well as students.

- Are you good at making presentations to the class?
- Are you able to command the attention of others while speaking?
- Are you successful at getting your point across in an argument?
- Are you able to convince your parents of the merits of a particular activity that you wish to pursue when they are against it?

School counselors must be able to identify students in need of special assistance.

- Can you tell which of your friends need help with schoolwork?
- Can you tell when a friend is upset about something?
- Do you know whether there's a drug problem in your school?
- Do you know if any of your classmates have been in trouble with the police?

Suggested Activities

Involve yourself in a program or organization that is concerned with social problems in your community: Illiteracy, juvenile delinquency, education and recreation for the handicapped, friendly visiting and escort service for the elderly. This will test your interest in helping others.

Volunteer to help with clerical tasks in a hot-line crisis center. If you can show yourself to be a particularly mature, responsible teen, you may be given an opportunity to take the training and become a telephone listener.

Volunteer to work in a half-way house.

Volunteer to help with recreation programs sponsored by the YMCA, YWCA, your local government, or neighborhood centers.

Get in touch with the American National Red Cross about opportunities to work as a youth volunteer. Red Cross youth volunteers serve as tutors for younger children and as aides in day care centers; help with community programs related to drug abuse among young people; and play and study with homebound and handicapped children.

Contact the Boys' Club or Girls' Club in your community. Clubs offer a wide variety of programs including work with retarded and handicapped children. Work with handicapped youngsters will help you build experience for future rehabilitation counseling.

Volunteer to work in your school counseling center during a free hour.

Ask your school counselor if you may observe a session in which he/she helps a student with college selection or occupational information. Think about your own goals for the future as you observe.

Using what you've learned about counseling in the preceding exercise, role-play a situation in which a student wants some information on prospective colleges or occupational choices. Plan the roles ahead of time. What questions does the counselor ask about interests? About skills? About training? What questions does the student ask about colleges? Occupations?

Invite the school counselor to speak to your class. Ask for a description of the work as well as training requirements. Prepare questions ahead of time.

Take part in a group activity designed to promote self-sufficiency and self-awareness. If you are a Girl Scout, find out if your troop has the From Dreams to Reality program, which promotes self-exploration through career awareness. If you are a Boy Scout, you may want to take part in the High Adventure program. Outward Bound retreats are also designed to encourage self-sufficiency.

Put yourself in the helper role on a daily basis. This may involve listening to a friend talk through a problem, visiting an invalid in the hospital, or becoming a Big Sister or Big Brother to a disadvantaged or handicapped child in your community.

Talk to your friends about their college or career ideas for the future. Take note of the different visions. Discuss the importance of planning for good occupational choices.

Read books and magazines on the counseling field. Test your interest.

Write for career information to the American School Counselors Association, Two Skyline Place, Suite 400, 5203 Leesburg Pike, Falls Church, Virginia 22041.

Related Occupations

School counselors are not the only people whose jobs involve helping others. Combine the following pictures of objects, signs, letters, and so forth and discover the names of eight other occupations.

See answers at end of chapter.

1.

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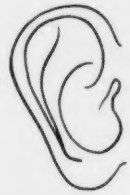

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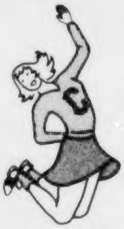

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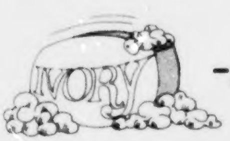

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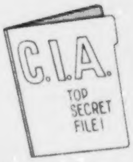
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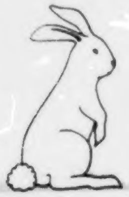

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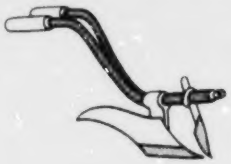
M +  -W + YMENT COUNSELOR

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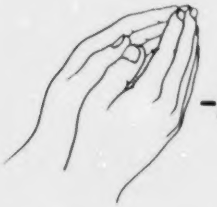
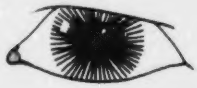
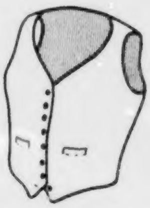
 -AY +  +  -V

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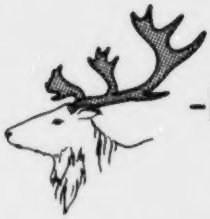
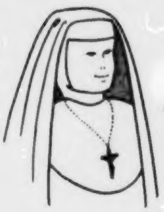
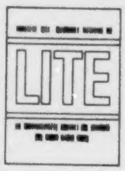
 -INDEER +  -T + 

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ATION COUNSELOR

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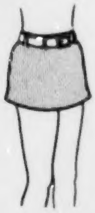
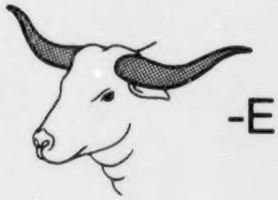
 -SKIRT +  -E

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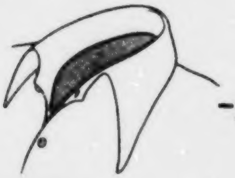
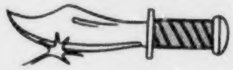
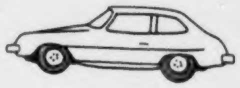
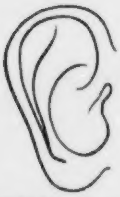
 -AR +  -D +  +E +

 -A PLANNING AND PLACEMENT COUNSELOR

Teachers need patience to go over the same point again and again.

Education Occupations

Job Facts

There isn't room in this book for a story about every education occupation. However, you'll find some important facts about nine of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and places of work*	*Training and qualifications*	*Other information*
SCHOOL OCCUPATIONS			
Kindergarten and Elementary School Teachers	Most elementary school teachers work in public schools in grades 1 through 6. Some work in private schools or in middle schools.	A bachelor's degree from a State-approved teacher education program is required for most beginning jobs. In some States graduate study is necessary to get permanent teaching certification. States and local school systems may have other requirements, such as U.S. citizenship. Elementary school teachers should have a strong desire to work with young children. They need to be warm, creative, and patient.	Elementary school teachers often work evenings and weekends. They prepare lessons, grade papers, attend meetings, and supervise student activities.

Exploring Careers

Occupation	*Nature and places of work*	*Training and qualifications*	*Other information*
Teacher Aides	Most teacher aides work in elementary schools. Schools with many students are more likely than small schools to employ teacher aides.	The training of teacher aides varies among school districts. Many teacher aides train on the job or in classes conducted by their school district. Some aides train at 2-year colleges, where they receive an associate degree. Teacher aides must have a desire to help children and a willingness to follow a teacher's directions.	Many teacher aides are part-time workers. Some are unpaid volunteers.
Secondary School Teachers	Most secondary school teachers work in public schools. Over half teach in senior high schools; about one-third teach in junior high schools.	A bachelor's degree from a State-approved teacher education program is required for most beginning jobs. In some States graduate study is necessary to get permanent teaching certification. State and local school systems may have other requirements, such as U.S. citizenship. Secondary school teachers need a keen interest in their subject as well as a desire to work with young people.	Secondary school teachers often spend evenings and weekends preparing lessons, grading papers, attending meetings, and supervising student activities.
School Counselors	School counselors help students understand themselves and resolve their problems. They give aptitude, interest, and ability tests. They hold individual and group sessions so that students can "talk through" their concerns. They may teach classes in occupations and careers or other special subjects. Most counselors work in elementary, middle, or high schools.	A master's degree in counseling and some teaching experience usually are necessary. Most States require school counselors to have counseling and teaching certificates. The education and experience requirements for these certificates vary among States. School counselors must be able to deal with all types of people. They work with students, parents, teachers, school administrators, and community leaders.	Some counselors work part time as consultants for private or public counseling centers, government agencies, or private businesses.
COLLEGE OCCUPATIONS			
College and University Teachers	Most college and university teachers work for public colleges and universities. Over half teach in universities and 4-year colleges and about one-fifth teach in 2-year colleges.	Graduate study is necessary. In most subjects at least a master's degree is required for a beginning job as an instructor. Additional graduate study, teaching experience, and research and publication of books and papers are needed to advance to the higher faculty ranks—assistant professor, associate professor, and full professor.	Although college and university teachers seldom teach more than 14 or 15 hours a week, they often spend about 55 hours a week on school-related activities, such as research and meetings with students. College and university teachers need a keen interest in their subject. They must study constantly to learn more about their field.

Education Occupations

Occupation	*Nature and places of work*	*Training and qualifications*	*Other information*
College Student Personnel Workers	These workers develop and administer services for college students. The field includes people with a number of different job titles: Admissions officer, dean of students, registrar, student housing officer, residence hall director, college placement officer, financial aid officer, student activities adviser, foreign student adviser, and counselor. These workers are employed in colleges and universities throughout the country.	Educational requirements vary for the different jobs in this field. A bachelor's or master's degree in personnel administration or in one of the social sciences often is preferred. For work as a counselor, a master's degree in clinical or counseling psychology usually is required. These workers must be interested in people and good at dealing with them. They must be able to handle unexpected and unusual situations.	Unlike college teachers, college student personnel workers usually work all 12 months of the year. Irregular hours and overtime work often are necessary.
College Career Planning and Placement Counselors	These workers help college students and alumni examine their career goals and find jobs. Sometimes they arrange for job recruiters to visit the campus and set up interviews with students. They work for colleges and universities and for community and junior colleges.	A bachelor's degree in psychology or sociology is customary for a job in this field. A master's degree in clinical or counseling psychology is helpful. People in this field should be energetic and able to work under pressure because they must organize and administer a wide variety of activities. They must have an interest in people and be able to get along with them easily.	These workers also are known as college placement officers. These workers frequently work more than 40 hours a week. The workload is especially heavy during the recruiting season.
LIBRARY OCCUPATIONS			
Librarians	Most librarians work in school libraries or media centers, public libraries, and college or university libraries. Some work for organizations that have their own library, such as government agencies, law firms, research organizations, and business firms.	Librarians usually need a master's degree in library science. School librarians may be hired with a bachelor's degree in library science plus appropriate courses in education. School librarians in most States must be trained and certified as teachers as well as librarians. Special librarians may need a master's degree or a Ph.D. in their subject field—law, chemistry, or fine arts, for example—as well as a master's degree in library science.	Librarians may work evenings and weekends.

Exploring Careers

Occupation	*Nature and places of work*	*Training and qualifications*	*Other information*
Library Technicians and Clerks	These workers do many of the routine and clerical jobs in libraries: They check out books, collect fines, sort and shelve books, order and process new materials, answer routine information requests, and operate the library audiovisual equipment. Library technicians—also called library technical assistants—have more training and greater responsibility than library clerks. Clerks work in all types of libraries. Technicians work mostly in large libraries.	A high school diploma usually is required. Most library technicians and clerks learn their skills on the job. Some technicians take courses in library technology at community and junior colleges; such programs generally lead to an associate of arts degree.	Job titles vary. People doing this kind of work may also be called library assistants, library aides, or pages. Library technicians and clerks may work evenings and weekends.

Answers to Related Occupations

CHILDREN'S LIBRARIAN

1. Media specialist, 2. Bibliographer, 3. Classifier, 4. Acquisitions librarian, 5. Reference librarian, 6. Bookmobile librarian, 7. Medical librarian, 8. Chief librarian.

SECONDARY SCHOOL TEACHER

1. Industrial arts teacher, Construction occupations; 2. Cooking teacher, Service occupations; 3. Library science teacher, Education occupations; 4. Law professor, Office occupations; 5. Modeling teacher, Sales occupations; 6. Flying instructor, Transportation occupations; 7. Engineering teacher, Scientific and technical occupations; 8. Watchmaking teacher, Mechanics and repairers; 9. Nursing teacher, Health occupations; 10. Economics teacher, Social scientists; 11. Home economics teacher, Social service occupations; 12. Art teacher, Performing arts, design, and communications occupations; 13. Forestry teacher, Agriculture, forestry, and fishery occupations; 14. Shop math teacher, Industrial production occupations.

SCHOOL COUNSELOR

1. Teacher, 2. Social worker, 3. Rabbi, 4. Employment counselor, 5. Priest, 6. Rehabilitation counselor, 7. Minister, 8. College career planning and placement counselor.

Sales Occupations

HONDA
MOTORCYCLES

This sales worker is pointing out the features of a trail bike to a prospective buyer.

"Hi. I'm Bryce Winters, your man on the street for WKRX. Today I'm interviewing Bill Morgan, a local automobile sales manager. Bill is a success at his job. He likes his work, likes his fellow workers, and earns a substantial income. However, success didn't come overnight or easily. Indeed, Bill has a long and interesting work history and has had all sorts of jobs. There is a common thread, though, that runs through almost all of the jobs Bill has ever held. Almost all involved selling. Let's see if we can get Bill to talk about some of the things he has done and tell us how he feels about his work. Mr. Morgan, tell me about your very first sales job."

Mr. Morgan: That was a long time ago. I started selling newspapers on the street in my home town in Oklahoma when I was 14. The early edition of the Sunday paper came off the press at about 6 p.m. on Saturday. A lot of farmers and oil field workers were in town on Saturday night for shopping and entertainment, and many liked to buy the paper then instead of getting home delivery on Sunday morning. On a good night I could sell 50 papers, which gave me a good supply of pocket money for the following week.

Interviewer: Did you have a particular corner or location where you sold papers?

Mr. Morgan: No, it didn't work like that. The kids who had been with the newspaper company for a long time were given the choice locations. The other kids just had to walk the streets, asking people to buy.

Interviewer: Did that seem unfair to you?

Mr. Morgan: I don't remember; probably not. Those who had been with the newspaper the longest got a better deal. Most businesses do that in one way or another. Anyway, I discovered ways of selling. For example, I would find out what times a movie was going to let out and be waiting in front. Also, I knew the schedule for buses arriving at the local bus station. Some of the drivers would let me board their buses to sell papers. One kid got permission from bartenders to walk through their places a couple of times a night. People in bars tend to be generous tippers.

Interviewer: Was that kid you?

Mr. Morgan: How did you guess?

Interviewer: What was your next sales job?

Mr. Morgan: A newspaper route.

Interviewer: I wouldn't have thought of that as a sales job.

Mr. Morgan: Well, it's true that I spent most of my time delivering the papers house to house and collecting money at the end of the week. But the job also involved sales. I wanted to make more money, which meant persuading more of the people who lived along my route to subscribe to the paper. The same is true for the route drivers who deliver bread, milk, soft drinks, and the like. To be successful, these people must build up their routes.

Interviewer: Were you successful at building up your paper route?

Mr. Morgan: Well, yes, I found new customers. I remember being a little frightened at first at the thought of knocking on doors and asking strangers to take the paper. This was very different from approaching customers on the street. I guess I was afraid that knocking on doors would disturb and annoy people. And I was right. Some got angry and showed it by slamming the door in my face. It didn't take long, however, to realize that those people didn't have anything against me personally. I can't say the same for some of the dogs along the route! Anyway, most people were pretty nice, and I did find a lot of new customers.

Interviewer: What did you do with the money you earned?

Mr. Morgan: I was saving some to buy a car, but I blew most of the money. I spent a lot on fishing gear. That's how I got to know Mr. Andrews, the owner of the local sporting goods store. He needed part-time sales help, so I quit the paper route to work after school and Saturdays in his store.

Interviewer: Did he hire you because of your knowledge of fishing equipment?

Mr. Morgan: Yes, I'm sure that was one of the reasons. Product knowledge was important in that kind of store. Some of Mr. Andrews' customers knew exactly what they wanted, but others needed information before deciding. I was flattered at being recognized as a good source of information on fishing. Being able to help customers with my knowledge made me feel important. I think many people get into sales work through their hobbies. It makes sense to take advantage of your natural interests. My 16-year-old daughter is working this summer in a pet shop. One of her hobbies is raising tropical fish.

Interviewer: And that's how she got the job?

Mr. Morgan: Yes, but it wasn't quite that easy. The pet shop owner wasn't looking for help, as far as we know. Linda just took the initiative, walked into the pet shop, and asked for a job. The owner said he was sorry, but he didn't need more help. Linda was very disappointed because that was her first choice for a summer job. I advised her to go back and tell the man that she would work for a week without pay to prove herself. Linda did, and he must have been impressed because he hired her with pay.

Interviewer: Getting back to your job at the sporting goods store, was there anything you didn't like about it?

"A sales manager is like a coach," says Bill Morgan (center). "I have good players, and it's up to me to get the best out of them."

Mr. Morgan: No, I liked it and I worked there until I left home for college. Well, I'll take that back. I didn't like sweeping the floor. And taking inventory was a nuisance, but we only did that once a year.

Interviewer: Did you plan on a sales career when you entered college?

Mr. Morgan: No, I was going to major in engineering. That's not to say that engineering and sales don't go together. Many industrial products are so complex that it takes people with engineering backgrounds to sell them. But I didn't know that at the time. Looking back, my plan to study engineering wasn't really well thought out. Engineers were in demand at the time, and all the smartest kids were majoring in it. I was just following the crowd.

Interviewer: I would like to ask you more about that later, but let's talk about the jobs you had in college.

Mr. Morgan: At first, I worked at a soda fountain, but that's not really a sales job. True, you take money from people and you give them ice cream and sodas in exchange. You don't need to persuade the customer, though. Just take the order. Anyway, I left the soda fountain after a few months to take a job in a clothing store near the campus. A friend of mine who worked there recommended me to the manager when a job opened up.

Interviewer: Did you have any experience selling clothes?

Mr. Morgan: No, and the manager was a bit hesitant about hiring me for that reason. But I did have the 3 years of retailing experience in the sporting goods store.

Interviewer: How long did it take to learn the job?

Mr. Morgan: After a couple of months I felt pretty confident. The manager was a patient instructor and the other sales people also gave me advice. In selling menswear you try to help the customer select something to make him look good. Of course, the same holds true for women. But anyway, you learn certain rules. A dark suit, for example, is more flattering to a heavy person than a light-colored suit. Fit is also very important. Fitting a customer can be frustrating. Clothing comes in standard sizes; people do not. It's better to lose a sale than try to get the customer to take something that doesn't fit well or can't be satisfactorily altered.

Interviewer: Why is it better to lose the sale?

Mr. Morgan: Because clothing stores, like many other businesses, need steady customers. Sooner or later the customer will discover that the suit, or whatever, fits poorly. Perhaps his wife or girlfriend will let him know. As a result, he probably will take his business elsewhere.

Interviewer: You mentioned suggesting clothes that look best on the customer. How did you handle people who disagreed with your recommendations?

Mr. Morgan: Well, sometimes they were right. And sometimes customers made selections that obviously weren't right for them. You felt like saying, "Gee, the

204

coat looks terrible on you." Sometimes there was the temptation to ask the customer if he was colorblind. I always tried to be as tactful as possible and steer the customer to something better. But I didn't argue. I'm sure you have heard the old saying, "Win an argument, lose a customer."

Interviewer: Did you work in the clothing store through college?

Mr. Morgan: As long as I stayed in college. I dropped out the second semester of my sophomore year. The math for engineering was not easy, and I just wasn't that interested in working at it. There I was, feeling like a failure at age 20.

Interviewer: What was next?

Mr. Morgan: Well, I stayed on at the men's store for a while, but the manager made it clear that he felt obligated to employ students. I knew some people who had left school to work in an aircraft plant in Texas that paid high wages. So I drove down there and was hired for a job in the incoming inspection department. All of the materials and parts that the aircraft company ordered from other companies came through that department. My job was to inspect these items to make sure the company was getting what had been ordered.

Interviewer: That certainly seems different from sales work.

Mr. Morgan: Yes, it was. I enjoyed the job for a while. It seemed like a very responsible position, and I was learning many new things. However, it did not involve contact with the public, which I missed. In fact, I began to feel isolated.

Interviewer: Was this your first experience with a job that didn't involve contact with the public?

Mr. Morgan: The summer following my first year in college, I got a truckdriving job with a freight company. I delivered incoming freight to stores and factories and picked up outgoing freight. It didn't last long. I got fired after a couple of weeks. I was driving the truck up a steep hill, and several cartons fell out the back. I didn't realize what had happened, so I kept driving. If I had loaded the truck properly to begin with, it never would have happened.

Interviewer: Still, that seems like a minor thing to be fired for.

Mr. Morgan: My boss had no sense of humor.

Interviewer: What did you do then?

Mr. Morgan: You mean for the rest of the summer?

Interviewer: Yes.

Mr. Morgan: I went to work in a bakery. That place was hot and the work was physically hard, but I knew it was temporary. You can tolerate a job you dislike if you know it will be over at the end of summer.

Interviewer: Getting back to the aircraft plant, did you look upon that as something to do until you found another sales job?

Mr. Morgan: Well, no, I didn't go into it with that in mind. After being there for several months, though, I realized that I much preferred sales work. It finally dawned on me that I was cut out for sales.

Interviewer: What was your next step?

Mr. Morgan: Selling cars. I had been considering car sales for some time. I was especially interested in sports cars, having recently bought a used British roadster. So I figured out reasons why sports car dealers in the Dallas-Fort Worth area should hire me. First, I had sales experience from the men's store and the sporting goods store. Second, I had a keen interest in sports cars and knew all about them. Third, I believed sports cars were catching on with the public, and this was a good opportunity for me to get in on the ground floor.

Interviewer: Were you successful in selling yourself?

Mr. Morgan: It took a while. The sales managers' reactions were, "Well, that's fine, but we don't need anyone right now." I got the brushoff. You know—"Don't call us, we'll call you." I followed up by writing letters to them, giving them even more reasons why they should hire me. That worked. After just a few days, I had a positive reply. A sales person at one of the dealerships was leaving, and the manager was willing to give me a chance. I was delighted.

Interviewer: Was selling cars like selling clothes?

Mr. Morgan: In many ways. For a lot of people, cars are a form of dress. Clothes make an impression; cars make an impression. People think, "This car says something about what I am." You, for example. I believe you are a very practical-minded person. Do you have a small economy car?

Interviewer: Yes, as a matter of fact I do. But I think that was a lucky guess.

Mr. Morgan: No, I was looking out the window when you drove up.

Interviewer: Can sales people really judge what customers are like?

Mr. Morgan: To a certain extent, yes. People give impressions by the way they dress, talk, and act. A professional sales person is good at observing people. You have to be a good observer in order to "qualify" a prospective customer.

Interviewer: What does "qualifying" customers mean?

Mr. Morgan: Finding out if the person has the ability to buy a car, and if this person really is interested in buying. Many people like to visit a dealer's showroom just to look at the new models. Perhaps they are curious or like to dream about having their favorite car. Some can't afford to buy, and others aren't ready to. Usually, a good sales person can quickly find out by asking questions. If the person doesn't seem like a buyer, you might say something like, "Look around all you like and then let me know if I may be of help," and then politely excuse yourself. Most people who sell cars are paid a commission on each car they sell. The more you sell, the more you make. Obviously, you can't afford to spend much time with someone who isn't going to buy. Nevertheless, it's important to be polite and leave the nonbuyers with a favorable impression. This person is going to buy someday—hopefully from you.

Interviewer: Suppose the prospective customer does want to buy, but isn't convinced that he or she should get one of your cars?

Mr. Morgan: I would find out what appealed to that individual. What are his or her needs? I would then point out how one of my cars could meet those needs. Actually, a professional will sell the entire car dealership, not just the car.

Interviewer: I don't understand.

Mr. Morgan: I'll give an example. The dealer I was with in Texas had one of the best service departments for imported cars in the entire area. People would drive 50 miles to have their cars serviced there. I always emphasized the excellence of our service department when talking with customers. That helped sell a lot of cars.

Interviewer: I can appreciate what you are saying. I've had problems getting the dealer to fix my car. You mentioned being paid a commission on each one you sold. Did a week ever go by when you didn't sell a car?

Mr. Morgan: The first 2 weeks on that job I didn't sell anything. Luckily, I had saved some money to tide me over. My first sale was to an elderly man who taught history in high school. And I almost blew it because I couldn't see him driving a sports car. So I tried to sell the man a compact sedan. He was a bit shy about admitting what he wanted and I had trouble picking that up. It was like having to read between the lines. That experience taught me not to judge a book by its cover.

Interviewer: Was that first sale a big event for you?

Mr. Morgan: Wow—was it ever. I had never sold anything that expensive in my life. I felt like jumping and shouting with joy. I had begun to have some doubts about my ability and needed that boost to restore some confidence. I still get a good feeling from making a sale. But back then things seemed much more challenging, so each sale was a personal victory. Within a few months, I was averaging about three cars a week and trying hard to become the leading seller in the company. The manager talked the owners into having a contest for us. First prize was a 2-week vacation in Mexico. Second prize was a week's vacation in New Orleans. The owner had two dealerships, so about a dozen sales people were in the contest. Winners would be the two who sold the most

"Whenever you try to persuade a person to do something, you are using sales skills."

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cars during a 4-month period.

Interviewer: You won?

Mr. Morgan: I came in a close third. But that was good. With less than a year's experience, I was one of the three top people. And I met my wife Eve during that contest.

Interviewer: You met your wife by selling her a car?

Mr. Morgan: Yes, and it wasn't easy. Eve wanted a particular model that came only with a 4-speed transmission. The problem was she didn't know how to use a stick shift. I was determined to win the contest so I promised to give lessons if she bought. She ordered a car but called the next morning to cancel out because she was having second thoughts about her ability to learn. Back then, she didn't seem to have the self-confidence that she has now. Well, I didn't want to lose the sale so I had to think of an alternative. I suggested we start the lessons with my car that afternoon and assured her that she could still cancel if things didn't work out. That's how our relationship started. We still have a copy of that sales contract. We got married about 2 years later. The wedding was a week after she graduated from college.

Interviewer: What did Eve major in?

Mr. Morgan: Education. She taught in high school for several years and then returned to college full time to get a master's in school administration. She's a high school principal now.

Interviewer: How long did you stay with the car dealer in Texas?

Mr. Morgan: Eve had an offer to teach in California. The West Coast appealed to us, and I figured it would be easy to find a job selling cars out there. One of the advantages of a sales career is the freedom to move about. You can sell anywhere, except maybe in the smallest towns. I went to work for a dealer in the Los Angeles area. The place was practically within walking distance of Eve's school and a short drive to the beach. It was a nice setup.

Interviewer: Why did you leave?

Mr. Morgan: Uncle Sam's orders. I got a letter directing me to report to the Army at Fort Ord, California. After basic training, they transferred me to Fort Myer, Virginia.

Interviewer: And you never returned to live in California?

Mr. Morgan: No, Eve joined me in Virginia and found a teaching job nearby. We got to like this area and saw no reason to leave.

Interviewer: What kind of job did you have in the Army?

Mr. Morgan: Would you believe I drove a truck?

Interviewer: That's a far cry from sales work.

Mr. Morgan: Well, any activity involves selling in some way. Anytime you persuade or induce a person to do something that you want, you are using sales skills. For example, you appealed to my ego in inducing me to do this interview.

Interviewer: While in the Army, did you have part-time sales jobs?

Mr. Morgan: Yes, a few. I worked briefly for a car dealer, but we couldn't agree on a satisfactory part-time schedule, so I gave the job up. I sold appliances in a department store for a while. I also dabbled in life insurance, but with little success.

Interviewer: What was the problem with life insurance?

Mr. Morgan: I just couldn't get interested. I'm not sure why. Perhaps because I had always sold products that people actively shop for—cars, clothes, sports equipment. Things they get enthusiastic about. People generally don't get enthusiastic about life insurance but buy it to protect their families. They must be convinced of the need for this protection. Therefore, selling life insurance successfully seems to require much more perseverance than selling cars successfully. Finding customers is such an important part of the job. Any type of selling requires perseverance, though, and I know several very successful insurance sales people who used to sell cars. I just feel more at ease with customers coming to me.

Interviewer: So you returned to selling cars after getting out of the Army?

Mr. Morgan: Yes, I went with a local import dealer first, and then switched to a larger dealer that handled domestic cars—the organization I'm with now.

Interviewer: Why did you switch dealers?

Mr. Morgan: Better opportunities. This organization had a reputation for being a good place to work. They treated the sales staff right, and the morale showed it. Within a year, I doubled my earnings.

Interviewer: How long have you been the sales manager?

Mr. Morgan: About 4 years. I was an assistant manager for 3 years before being promoted.

Interviewer: Do you ever miss being a sales worker?

Mr. Morgan: I still am—but I know what you mean. At times, I do miss selling. But managing a sales staff is another kind of challenge for me and I thrive on challenges. I'm quite a competitive person. I keep pushing myself to see what else I can handle, how much more I can accomplish. In my job as sales manager, the challenge lies in getting a bunch of aggressive sales workers to pull together as a team. At the risk of sounding corny, I see myself as coaching a sales team. I have good players, and it's up to me to try to get the best out of them. It's especially satisfying to see the young people develop their potential.

Interviewer: Thank you very much. I appreciate your taking time out for this interview.

Mr. Morgan: It's been my pleasure.

Interviewer. Well, that's it for today, listeners. Tune in tomorrow when I talk with skydiver Laurie Stapleton. This is Bryce Winters, your man on the street, saying goodbye from WKRX.

What Makes a Good Sales Worker?

This section discusses personality traits that contribute to success in sales work. Personality often is the key factor in enjoying sales work and doing well at it, and such traits as self-confidence, enthusiasm, and drive usually are evident in people who make a career of sales.

In his interview by radio station WKRX, Bill Morgan revealed some of the personal characteristics and attitudes common to successful sales workers. See if you can remember things Bill said in the interview that clarify or support the points being made.

Sales workers constantly deal with other people on a one-to-one basis. Insurance agents, for example, are always on the lookout for potential customers, or prospects. They must like people and enjoy striking up conversations with strangers to handle this aspect of the job well. Because contact with other people is so important, an *outgoing personality* is a plus. This is not to say that one must be a "gladhander" or a "backslapper" to be successful. In fact, some people are put off by too much friendliness. Genuine warmth and a pleasant personality, however, often make customers more receptive to a sales worker's ideas.

Contacting prospects and keeping in touch with customers are important parts of the job. Real estate agents who handle commercial or industrial property, for example, may take a long time putting together a big deal because of its intricate legal, financial, and political aspects. To keep the prospect of a sale "alive," they must keep in touch with all the parties to the deal—over a period of months or even years—and keep their interest from flagging. In situations such as these, *drive and motivation*, or the ability to be a "self-starter," are absolute "musts."

Enthusiasm and a positive outlook are also valuable traits. A sales worker's enthusiasm can be infectious, and often plays a big part in overcoming a customer's hesitancy to buy. Even enthusiastic sales workers have bad days or experience slow sales periods; however. An upbeat, positive attitude helps sales workers make it through discouraging times.

The sales worker's *product knowledge* has a lot to do with the attention we give to his or her "pitch." Sales workers' familiarity with the products they sell often makes the difference in overcoming our hesitancy to buy. Imagine, for example, that you are in a stereo store, shopping for a new component stereo system. Would you buy from a clerk who didn't know the differences between the various systems available and couldn't suggest even one that would match your particular needs and pocketbook?

An outgoing personality is a "must" for people who sell "big ticket" items.

Because sales work is highly competitive, such traits as *aggressiveness and self-confidence* are important for people in this line of work. A manufacturer's representative trying to convince a customer to buy the company's multimillion-dollar computer system, for example, may have to beat out a number of competitors. He or she must be firm and convincing in the sales presentation to company officials and must not hestitate to call back

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A job selling athletes' footwear may require learning about all the major brands of running shoes.

again and again to explain how the system he or she is selling is superior to what competitors have to offer.

Aggressiveness alone won't make many sales, however. Sales workers also need a keen *understanding of people and human nature.* Sensitivity to people's behavior and to the things that motivate them is quite important. Successful sales workers use this sensitivity to judge when a sales approach is "working" and when it should be changed. This quality is especially helpful in dealing with people buying very expensive items that reflect their self-image as well as affect their pocketbook, such as cars or houses. Real estate agents, for example, must be able to select the kind of properties that will appeal to their clients. Otherwise they won't be able to satisfy their customers' needs, and won't make many sales.

Closely related to understanding people is the *ability to inspire trust and confidence.* Imagine, for example, that you are in the market for insurance to protect your home and family. Would you buy from an agent who didn't seem to know the business and whom you weren't sure you could trust?

Persistence is another characteristic of successful sales workers. A securities sales worker, for example, may call a client many times over a period of months without getting a single order to buy or sell stock. The client may be short of cash, have tax problems, or just not think the time is right to make a move. Eventually, however, conditions usually change, and that client may then become a good customer.

Because of the competitive nature of sales work, people in this field must be *able to work under pressure.* The way many sales workers are paid is one of the reasons the

This street vendor has turned her knowledge of plants into a profitable business.

field is so competitive. Many firms set quotas, or a minimum number of sales, for their sales workers. Other firms pay neither an hourly wage nor a straight salary to their sales workers; they pay commissions instead. That is, they pay a percentage of the value of the goods that are actually sold. Or, in some cases, many sales workers may be trying to sell the same product, such as a house in the case of real estate agents.

Sales workers often work independently, with little guidance or supervision. This requires the *ability to plan and organize.* Insurance agents, for example, often schedule appointments in the evenings and on weekends, when prospective customers are usually free. It's up to the agent to organize his or her time efficiently—to see clients and take care of paperwork, too.

The ability to plan and organize is nowhere more important than in the sales worker's own financial situation. Sales workers who live on commissions, for example, may have very irregular earnings. A real estate agent may earn $5,000 in 1 week and then nothing at all during the next several months. Sales workers such as these have to be able to withstand slow sales periods. This means saving during times when earnings are high. The following exercise on setting goals illustrates the kind of planning involved.

A college degree helped this woman land a job in insurance sales.

Setting goals. Commissions are the only source of income for many sales workers. As a result they often must plan carefully and set sales goals for themselves to be financially secure. If you were in the situation below, what sales goal would you set?

1. The company you work for pays you a commission of 5 percent of the total cost of the items you sell. If you sell $1,000 worth of goods, you make $50; if $2,000, you make $100; and so on. The cost of each item you sell is $500.

2. Your fixed monthly living expenses are as follows:

Rent and utilities	$300
Car payment and upkeep	100
Food	150
	$550

Given the above, how many items must you sell each month just to meet your fixed expenses? How many additional items must you sell to pay for the other things you would like to have such as savings, entertainment, eating out, and furniture? Add those two numbers together and you have your monthly sales goal.

Training

Sales work covers a very wide range of occupations—from department store clerk to insurance agent, from people who sell one piece of bubble gum at a time to those who sell $10 million of stock at a time. Training requirements, too, vary a great deal.

In some sales occupations, skills can be obtained relatively quickly right on the job. Gas station attendants, for example, must be able to pump gas, make change, and keep the station clean. These are things they generally learn their first day on the job.

Other sales occupations require advanced degrees in technical fields. Manufacturers' representatives who sell helicopters for aerospace firms, for example, need degrees in aeronautical engineering in order to fully understand the products they sell and to be able to communicate effectively with their customers. In addition to their academic training, sales workers in firms such as these usually receive a thorough orientation in the kinds of aircraft the company makes.

These are the extremes. More information on the training needed for specific sales occupations appears in the Job Facts at the end of this chapter.

Many high schools offer programs in distributive education that provide an excellent background for a wide variety of jobs in sales and merchandising. Students in these programs generally spend half their time in school and the other half working in jobs that provide practical sales experience. They take such courses as an introduction to marketing occupations, general merchandising, fashion merchandising, hotel and motel management, marketing, creative selling, advertising, and food distribution. Practical sales experience comes from working in local businesses, including department stores, grocery stores, and restaurants.

There are college programs that lead to associate, bachelor's, and advanced degrees in such fields as business, marketing, real estate, and insurance. The courses given at community and junior colleges and in 4-year colleges and universities provide a background for selling jobs and also for management jobs in marketing and merchandising.

Business and trade schools offer programs that last from a few months to several years in such fields as marketing, merchandising, and real estate.

In some sales occupations, employers or industry associations offer formal training for beginning and experienced workers alike. Training programs for people who sell securities, insurance, real estate, or automobiles provide a thorough coverage of these fields. Continuing education is important because the regulations affecting sales work in these industries are numerous and complex and because the products or services being offered to the public change, too. Even experienced sales workers must refresh and update their knowledge of the field.

Some sales workers, such as insurance agents and real estate agents, must be licensed by the State in which they work. Others, such as securities sales workers, must be registered with the firm they work for. To qualify for licensing or registration, workers must pass an examination that tests their knowledge of the field they work in. These measures are designed to ensure that sales workers who handle our property or large amounts of our money are properly trained to do so.

Demonstrating a new product is an effective sales technique.

Securities Sales Worker

BES
PNB
GE
2s10 5/8
2s24 5/8
2s18 7/8
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Janet Woods sells stocks and bonds for a large brokerage firm.

"Why did I stay up for the late movie?" thought Janet Woods as she turned off her alarm clock and rolled sleepily out of bed at 6:30 a.m. "I've got a busy day ahead, and I'm going to have to be as alert as possible. A lot of people will be asking my advice today, and I also have to teach that class at noon."

An hour and three cups of coffee later, she was in her car on the way to another day at the brokerage house where she had been a securities sales worker for the past 4 years. Janet had joined the firm immediately after receiving her master's degree in finance. The first 2 years were hard, as she struggled to get customers in this very competitive field. But by now she was beginning to achieve real success, and thought she had a good chance of being promoted to office manager someday.

When Janet arrived at her office, a copy of *The Wall Street Journal* was already on her desk. Although the stock market doesn't open till 10 a.m., Janet always arrives at work well before the market opens to read various financial publications and keep up with current developments in the world of business. She also finds this a good time to catch up on her paperwork.

As she was finishing the newspaper, a phone call came through from Jack Martin, a student at Middlesex Junior High, where Janet had given a talk the week before. Jack explained that he had saved about $400 from his paper route over the past year and was interested in investing this money in the stock market. He asked Janet if she would recommend a stock.

"That's hard to do, Jack," Janet said, "unless I have some idea of your investment goals. Are you willing to take a chance on a stock with good potential for capital gain? Or are you interested in a stock that is less sensitive to the ups and downs of the market, but that pays a good dividend?"

"I'm not quite sure what you mean by capital gain," Jack responded. "Is that just the profit you make when you sell a stock?"

"Yes, a capital gain is the profit you make when you sell your stock for more than you paid for it," replied Janet. "And a dividend is the money paid to shareholders out of a company's earnings."

Jack seemed puzzled. "Why can't I buy something that both has a good chance of going up and pays a high dividend? Wouldn't I make much more money that way?"

"That's true, Jack, you probably would if we could pick out such a stock. But we would really have to be lucky. You see, stocks are usually thought of as belonging to one of two broad categories: Growth stocks and income-producing stocks. Many growth stocks do pay some dividends, but the companies usually use most of their profits to help the company expand, rather than pay this money out to shareholders in the form of dividends. Then, because the total worth of the company increases, the company's stock also increases in value. Income-producing stocks, such as utility company stocks, on the other hand, generally are better for people who want a good yield on their money but aren't so concerned with quick capital gains."

"I see that picking a stock is more complicated than I thought," said Jack. "I guess I should learn some more about the stock market before I actually invest. How should I start?"

"I think I can help you with that," replied Janet. "My company has prepared a pamphlet that explains the basics of investing. We also put out a monthly list of recommended stocks, both for capital gain and yield. I'll mail these to you today. By the way, I'd like to commend you on the way you are going about investing your money. You certainly seem to have a good head on your shoulders."

"Thanks—and thank you for your time," Jack said. "I'll call back after I've learned some more."

Janet smiled as she put down the phone. She enjoyed helping young people, especially those as ambitious and eager to learn as Jack. He might be a good customer one day....

Janet knows the importance of having steady customers. In her 4 years as a securities sales worker, she has built a following of investors who have confidence in her judgment. They return time and again to buy and sell stock, and each time Janet earns a commission. In

THE WALL STREET JOURNAL

Janet must keep up with what is happening in the business world.

addition, the fact that people trust Janet with large amounts of money makes her feel important.

Around 9:15 Janet received a call from Ellen Swanson, one of her clients. As usual, Ellen got straight to the point.

"Janet, I've just finished that article in this morning's paper on the proposed merger between Carbon Industries and United Copper Company. What is that going to do to the value of my shares in Carbon Industries? Should I sell?"

Janet replied firmly, "I believe the merger will have a favorable effect on your Carbon Industries shares, and I certainly don't think that now is the time to sell." She went on to explain her reasoning, presenting a picture of the industry and its financial workings in a direct, easily understood manner.

"What you're saying makes sense to me," said Ellen. She asked Janet to contact her if there were any further developments and then said good-bye.

"Well, the telephone calls have begun," thought Janet. "I might as well make that call to Mr. Johnson right now." Mr. Johnson had opened an account just the week before.

"Good morning, Mr. Johnson," said Janet a few moments later. "I think that now would be a good time for you to buy AC&C. The price is a little depressed right now due to the downturn in the market, but the stock has an excellent history of earnings and dividend increases and prospects for the future look good. In addition, at its current price the company has a dividend yielding over 7 percent. I believe this is important to you as I know you are looking for income as well as possible capital gain."

"The stock sounds like a good investment," said Mr. Johnson, "but is there any chance of my losing money?"

Janet replied, "Over the next few weeks the stock may go down a little more, of course, but over the long run

Janet has built up a following of customers who want to invest their money.

prospects are excellent for capital gain. In the meantime, you will be receiving good income from dividends, which I believe the company will continue to pay. It has been paying dividends since 1880 and the prospects seem as bright as ever. Of course, not all of your money should be invested in any one company, but I believe AC&C is safe."

"It does seem like good stock to have and I could use the income from dividends," said Mr. Johnson. "Why don't we buy about 300 shares?"

"Good, then, I'll put in an order for 300 shares of AC&C at the market," said Janet.

After hanging up, Janet placed a buy order for Mr. Johnson's 300 shares of AC&C with the firm's trading department at the stock exchange in New York. There the order would be sent to a trader on the floor of the exchange who would execute the transaction.

When the market opened at 10 o'clock, Janet watched the ticker tape and soon saw a trade for 300 shares of AC&C go by on the tape. Within a few minutes, she received confirmation of the purchase from the New York office of the firm's trading department. Then she called Mr. Johnson to tell him that the trade had been executed.

Janet was very busy for the rest of the morning. She spent much of the time on the phone—talking to customers, executing buy and sell orders, providing information.

Around noon, two of her co-workers stopped by to ask if she would like to go out to lunch.

"No, thanks," said Janet. "I'm giving the course at the library this week for beginning investors." About once a month, Janet's firm sponsors a 1-week course on investing in stocks and bonds. These courses, conducted by the brokers, provide the public with useful information and enable brokers to speak to a number of people at one time. Often brokers gain additional customers through these seminars.

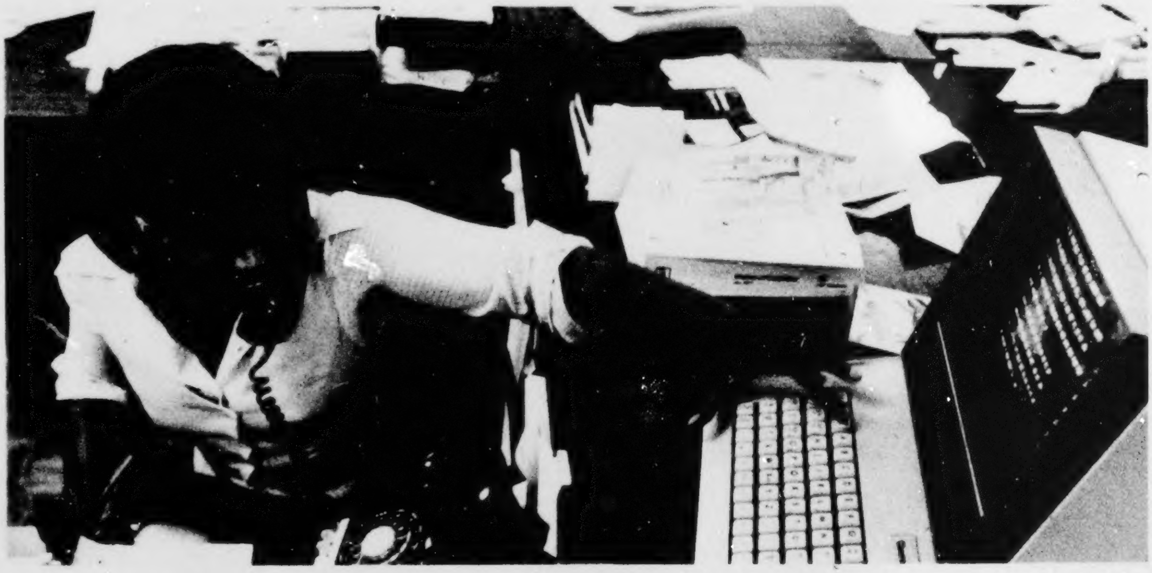
When Janet returned to her office after the seminar, she found that a number of messages had already piled up on her desk.

"It looks like a busy afternoon ahead," thought Janet as she picked up the phone and began returning her customers' calls.

For the rest of the afternoon, until the market closed at 4, Janet was indeed very busy calling and being called by her clients, placing buy and sell orders and giving her opinion on specific stocks.

After the market closed, things slowed down. Janet stayed at the office for about 45 minutes taking a few buy and sell orders for the next day and exchanging ideas on stocks with some of the other brokers.

Then she checked her calendar to be sure she didn't have any appointments with clients or prospects that evening. Tonight she would catch up on her sleep.



Janet says, "I like knowing that people trust me with their investments."

Sales Occupations

Exploring

Securities sales workers must be articulate and persuasive. Persuading people to buy or sell securities is one of the most important parts of the job.

- Are you a good listener?
- Do you remember what people tell you about themselves?
- Can you tell how people feel about things by talking to them?
- Do you like to campaign for a school office?
- Are you often chosen for group activities?
- Do you like to debate?
- Do you like to speak in front of your class?

Because they often work for commissions, securities sales workers must have initiative and be self-starters.

- Do you get up in the morning by yourself?
- Do you do your homework and household chores without being prodded by your parents?
- Do you stick with projects until they are finished?

Securities sales workers must perform well in a highly competitive situation.

- Do you like being best at the things you do?
- Do you like entering contests and playing competitive games?
- Do you want to be at the top of your class?

Securities sales workers must be optimistic in order to face slow sales periods and downturns in the stock market.

- Are you persistent?
- Do you always assume things will get better?
- When your team loses, do you still look forward to the next game?
- Are you good at cheering up your friends when they are depressed?
- Does failure make you want to try harder?

Unlike many other jobs, success in sales work can be measured directly by the amount of money one makes.

- Is making money important to you?
- Do you like having your performance measured?
- Do you like to be recognized when you do something well?

Suggested Activities

Look in the financial section of your newspaper. Do the news stories in this section interest you? Can you understand the stock tables on the previous day's activities on the various exchanges?

Are there any large companies based in your home town? If so, try to find them in the stock tables.

Visit a brokerage office in your community. While you are there, observe the surroundings. What are the brokers doing? Are they on the phone a lot? How do they dress?

Go to your school or public library and look for books or pamphlets on investing in securities.

An investor is trying to decide between putting her money in a savings account yielding 5.5 percent per year or investing in a dividend-paying stock. Which of the following stocks would provide a higher yield on her money than the savings account? (Forget about the possibility of capital gains or losses.)

Stock	*Price (dollars)*	*Dividend (dollars per year)*
AC&C	60⅞	4.60
International Computers	263	11.52
American Widget Co.	57	1.90
Fast Food Enterprises	53¾	.36
American Railroad Co.	30½	2.32
Mouse Traps Inc.	40¾	.32
D.C. Electric Co.	14⅝	1.34

See answer at end of chapter.

The price-earnings (P-E) ratio for a stock is determined by dividing a stock's price by the amount of money each share earned over the past year. For example, a stock selling at $25 that earned $5 would have a P-E of 5. Look up the P-E ratios for five different stocks in your newspaper's financial section. Do all stocks have the same P-E ratios? What could be some of the reasons for the differences?

Pretend that you have just been given $1,000 to invest. Select a stock or stocks that you like and determine how many shares you can buy. Chart the value of your stocks over a period of time. How did you choose your stocks? How much money did you make or lose?

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Exploring Careers

The Dow Jones Industrial average is one measure of stock market performance. Go to your library and see if you can find a chart showing the Dow's performance over the past 25 years. Can you identify any periods that would have been good times to buy stocks? Looking at past and present trends, do you think now is a good time to buy or to sell? Why?

Join a Business Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, try for the American Business and Salesmanship merit badges.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges.

Contact the personnel departments of securities firms in your community and ask for career information. Many firms have pamphlets and brochures that describe jobs in the securities industry.

For more information on the work of securities sales workers, write to the Securities Industry Association, 20 Broad Street, New York, New York 10005. There is a $1.00 charge for this material.

Related Occupations

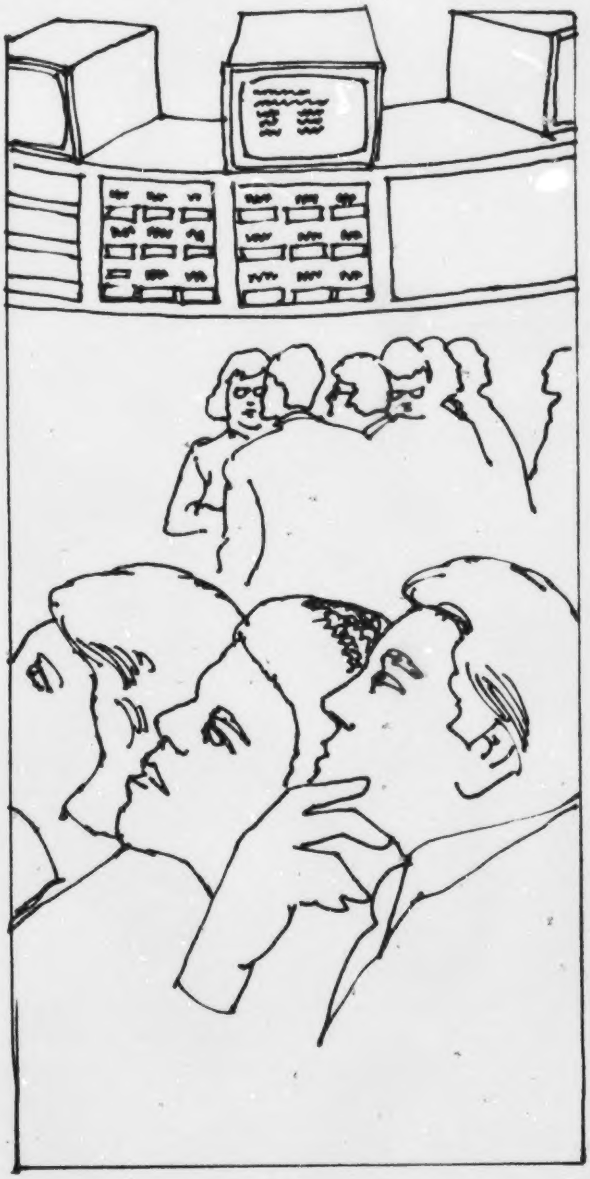
Securities sales workers are not the only people who sell relatively expensive items. See if you can unscramble the following job titles to find four other sales workers whose jobs are similar to the securities sales worker.

1. SUREINCAN GENTA NAD BORRKE
2. LARE TASTEE TANGE NAD ORBKER
3. BILEOOMAUT LASSE ROWREK
4. CHATY REKORB

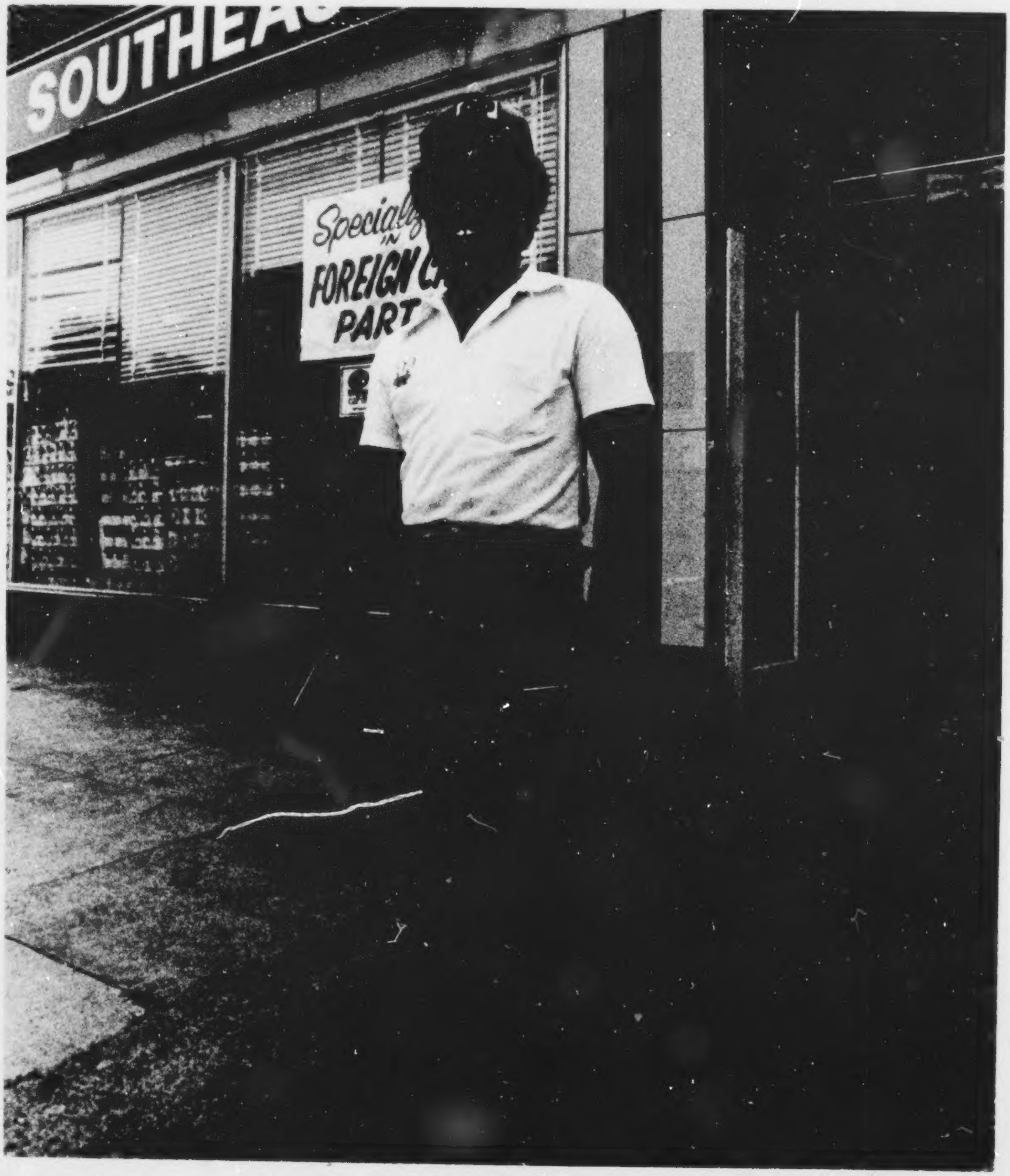
If you are interested in the securities industry, you might investigate the following nonselling occupations after you unscramble them.

5. TIRUCESY STYLANA
6. RODER KLERC
7. GINMAR RADERT
8. DONB DARTER

See answers at end of chapter.



Auto Parts Counter Worker


SOUTHEA
Specialize
IN
FOREIGN C
PART

Norman Edwards is an expert on auto parts. His store stocks over 20,000 different items.

Exploring Careers

Norman Edwards stood behind the counter of Southeast Auto Parts Store. In front of him, he could look out the window past the battery and tool displays at the people and cars passing on the busy street. Behind him, there were about 20 metal shelves, each 7 feet high and about 30 feet long. These shelves contained over 20,000 automobile parts. Norman had memorized the number, use, and price of hundreds of these parts.

It was only 8:30 a.m. and the telephone was ringing again for at least the tenth time since the store had opened at 8:00. "Southeast Auto Parts, may I help you?" said Norman calmly as he pulled a note pad closer to the phone.

"I hope so," answered the caller. "This is Jerry over at Collin's Exxon. Do you have any brake shoes for a 1971 Plymouth Scamp?"

"Just a second, Jerry, let me check," said Norman as he quickly thumbed through his parts catalog to find the proper number for the part. The parts catalog was actually a loosely bound collection of various manufacturers' catalogs. The catalog rested on top of the counter and extended over 4 feet along the counter. Norman quickly found the desired part and checked the number, ST5329. Once he had found the part's number, he knew from memory that he had the part in stock and that the price was $12.25. If he hadn't known the price, though, he could have checked the current price list that accompanies each manufacturer's catalog.

"We have the part in stock, Jerry. I'll have Susan deliver it in just a few minutes. Do you need anything else?"

"Not right now, thanks," said Jerry.

Norman then turned to the young woman who was stocking shelves behind the counter and said, "Susan, would you get some brake shoes, number ST5329, and deliver them to Collin's Exxon?"

"Sure," said Susan. "Anything else you want while I'm out?" Susan is a driver. It is her job to deliver parts to customers, pick up parts at the warehouse, and help stock parts on the shelves. Sometimes she helps wait on customers when Norman is very busy. Norman himself started out as a driver and in fact learned the trade that way. When he became familiar enough with the business he was promoted to parts counter worker.

Norman then handed Susan a list of numbers of parts that were not in stock but that customers had ordered that morning.

"While you're out, pick these up at the warehouse. I promised we would have them by noon," he said.

Just after Susan left, three customers walked into the

"If you treat people right, they come back again and again. I know a lot of them by name."

store at the same time. "That's how this business is," thought Norman, "it comes in spurts." Norman then waited on the customers at a steady pace. The first wanted a bypass hose for a 1972 Chevrolet Camaro which Norman quickly found was part number CH476. He then got the part off the shelf, wrote out a receipt, and took payment.

Norman's next customer had a problem. His 1974 Chevrolet Vega was burning too much oil and he wanted to know if Norman had any ideas for improving this situation.

"What kind of oil are you using in your car now?" Norman asked.

"I believe it's 10-W-30, but I'm not absolutely sure," the customer responded.

"That could be the problem, then," Norman said. "10-W-30 is a fairly thin oil. Why don't you try this 10-W-50? It just might solve your problem. It is much thicker and as a result is not so likely to burn."

The customer said that sounded reasonable and bought 5 quarts of 10-W-50, enough to change the oil in his car.

Norman's next customer was not so easy to please. He wanted a part that independent parts stores, such as the one Norman works in, do not stock. Automobile dealers do, however. Norman politely explained this to the customer and said he was sorry he couldn't be of help this time but to check with him if the customer needed any other parts in the future. He then referred the customer to a local Ford dealer who Norman knew would have the part.

During the time Norman was waiting on the walk-in customers he was also helping customers over the phone. As he spoke, he took orders on a note pad which he always kept beside him.

About 10:30, Jane Bregan walked into the store, greeted Norman, and went to the shelves behind the counter. Jane was a manufacturer's representative and was in the store to be sure that there was an adequate stock of all her company's parts. She would be in the store for another couple of hours, taking inventory on her line of parts and ordering those the store needed.

While Jane was in the back of the store, Norman continued waiting on customers. He knew many of the customers by name and, when business slowed, he would sometimes stop and talk for awhile with them. But lulls didn't occur very often, and never lasted long.

A little after noon, Susan returned, bringing sandwiches from a local carryout for them both. Norman always ate in the store, grabbing a bite when he could. Norman was just about to eat his sandwich when a customer walked into the store.

"May I help you?" Norman asked.

"Yes, I need a new clutch plate for my car. Do you have any in stock?"

"We sure do," said Norman. "What kind of car do you have?"

"It's a 1970 Chevrolet Impala."

"What size engine?" asked Norman.

"I don't know," said the customer.

"Sorry," said Norman, "but I can't get the part unless I know what size engine your car has. General Motors made both 10-inch and 11-inch clutch plates for 1970 Impalas, depending on the number of cubic inches in the engine. I could sell you a clutch plate right now, but there is no way of being sure it would fit without knowing the size of your car's engine."

"Well, I can take both clutch plates and return the one that doesn't fit," replied the customer.

"Sure," said Norman, "but I'll have to charge you now for both of them and give you a refund when you return the one that doesn't work."

"It sounds like you don't trust me," said the customer angrily. "I'll just take my business elsewhere," he added, slamming the door as he stomped out of the store.

Norman was sorry to lose the sale but relieved that the customer had left. When he had first started in the business, Norman had gotten an ulcer from dealing with customers like this one. But by now he was more philosophical. He regarded unreasonable customers as an unavoidable part of dealing with the public. Norman was always polite and tried to help, but it no longer bothered him if a difficult customer went away angry. In fact, thinking of the customer's next encounter with a parts counter worker brought a smile to Norman's face.

Exploring

Parts counter workers deal with the public.

- Do you enjoy talking with people?
- Is it easy for you to talk with people you don't know?
- Do you like giving directions to strangers?
- Can you keep your temper even when people are rude to you?
- Are you good at remembering people's names?

Parts stores, like any other business, require a great deal of organization and recordkeeping in order to run smoothly.

- Do you make lists of things to do?
- Do you finish your homework on time?

- Do you like to keep your room neat and orderly?
- Can you find your possessions quickly?

Parts counter workers often work under pressure. They have to work quickly and accurately. They need good memories to keep track of thousands of parts.

- Can you do good work even when you are rushed?
- Do you like playing chess or checkers against a time clock?
- Are you good at remembering your friends' phone numbers, addresses, and birthdays?

Parts counter workers must have a good knowledge of cars and how they work.

- Do you like to read car magazines?
- Are you interested in how things work?
- Do you know what a carburetor is and what it does? A clutch? A shock absorber? How many other auto parts can you name?
- Do you repair your bicycle when it breaks down?
- Do you take things such as old clocks and toasters apart to see how they work? Can you put them back together?

Suggested Activities

Arrange a visit to an auto parts store. Ask the counter worker to show you how to find a specific part in the parts catalog. Then see if you can find the price for the part in the price list. See if the counter worker has any extra or out-of-date catalogs and price lists that you can take home.

If you own a bicycle, see how many parts you can identify. You should be able to identify at least 50 parts. Can you imagine how complicated an auto parts counter worker's job is with the thousands of different parts in each car and the hundreds of different types of cars?

Join an Auto Mechanic Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, try for a merit badge in Salesmanship.

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters

To serve customers faster, Norman has memorized the location of most parts in the store. "Our customers don't want to waste a lot of time waiting for me to find something."

plan projects, take field trips, and hold competitions in such skill areas as auto mechanics.

Join a chapter of DECA (Distributive Education Clubs of America) if your school has one. DECA clubs aid in the development of good sales habits and techniques, and help students get part-time sales jobs while they are still in school.

Spend time on hobbies and other activities in which you build or repair things. You might, for example, volunteer to repair appliances for a good cause or make repairs around your home.

Participate in an activity that involves handling money and making change. Selling tickets, working in a concession stand during athletic events, selling Girl Scout cookies, or having a newspaper route would all provide good experience.

Write for information on a career as a parts counter worker to Automobile Service Industries Association, 444 North Michigan Avenue, Chicago, Illinois 60611 and to Automotive Service Councils, Inc., 188 Industrial Drive, Suite 112, Elmhurst, Illinois 60126.

Related Occupations

Parts counter workers are just one link in a chain of automobile-related sales occupations. The work of five other people is described below. If you need to, refer to the list of job titles at the end.

1. I work for a company that makes automobile parts and accessories. I visit auto parts stores and sell them the parts my company makes. Who am I?

2. I work for new and used car dealers. My earnings aren't always as steady as a parts counter worker's, but once I made over $1,000 in 1 week selling new cars. Who am I?

3. I work for a large automobile dealership. When customers have problems with their cars, I am usually the first person they see. I determine what is wrong with the car, write a repair order, and then get a mechanic to do the actual repair. Who am I?

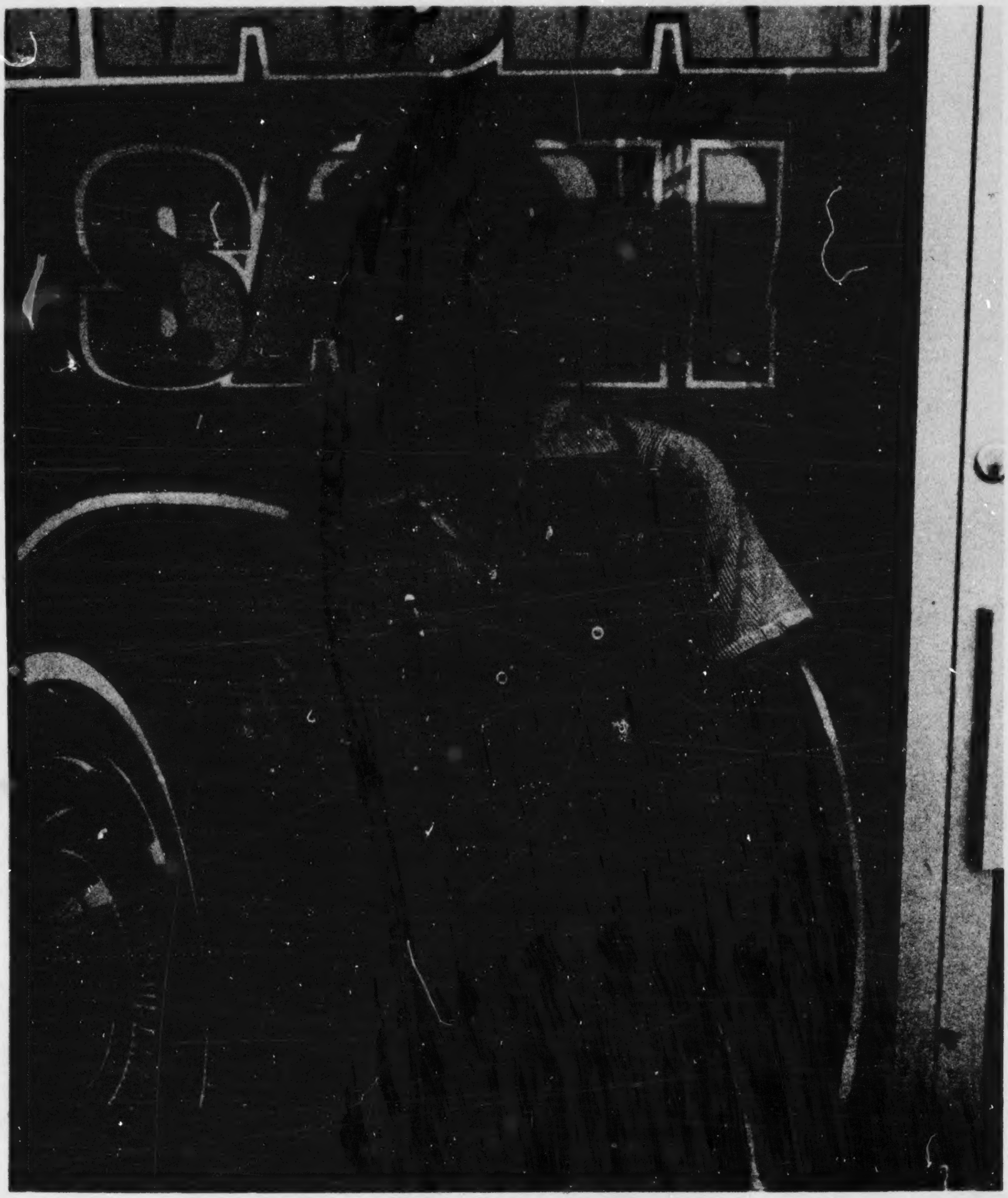
4. I'm not actually a sales worker, but I need to know as much about cars and how they work as a parts counter worker does. In fact, cars wouldn't last long if it weren't for me, because I am the person who fixes them when they aren't running well. Who am I?

5. I also keep cars on the road and trouble free. I put fuel into them and check items such as oil level, tire pressure, and transmission fluid level. I also do minor repairs such as fixing flats. Who am I?

Automobile mechanic
Automobile sales worker
Automobile service adviser
Gasoline service station attendant
Manufacturer's representative

See answers at end of chapter.

Gas Station Attendant



Al Dietrich likes the variety in his job.

Sales Occupations

Al Dietrich had worked the 3-to-11 shift 6 days a week at Simm's Service Station since he had entered the University of Oregon 2 years ago. He was studying to be an accountant and needed a job to help pay his school expenses. Al had jumped at the chance when he heard about the opening at the gas station. He had worked around cars even before he could drive. The hours of his shift were just right since all his classes were in the morning.

Al arrived at Simm's just before 3 p.m. As he entered the office area, he ran into Brian, whose shift was just ending.

"How's it going, Brian? Been busy today?"

"No, I guess the rain is keeping people home," Brian replied. "In fact, I even had time to clean the service bays. I thought you might want to do some studying tonight."

Cleaning the bays was one of Al's jobs and he appreciated Brian's taking on the job himself.

"Thanks a lot. I don't suppose you had time to clean the restrooms, too?" Al said with a grin. That was another of Al's jobs, since he was on the late shift which generally was less busy.

"No, I didn't, but they shouldn't be too bad. See you tomorrow."

Soon after Brian left, Al's first customer of the day pulled into the station in a red Ford pickup. "Fill it up with regular, please," said the customer when Al walked over to the driver's window.

Al turned on the pump, inserted the nozzle, and set the handle at a moderate flow of gas. He walked over to the driver again and asked, "Shall I check under the hood?"

"Thanks, I checked it before I left home, but would you check the tires? I think the left rear one may be a bit low."

"Sure thing," said Al as he began checking the tire pressure with his gauge.

"The front two look okay, 28 pounds each," he said as he walked to the rear of the car. When he checked the left rear tire, though, the gauge read only 24 pounds. Al used the air hose to bring it up to the proper pressure.

Just as he finished recoiling the air hose, the gas pump clicked off. Al finished filling the truck's tank without spilling a drop.

"That will be $8.50," he said. He made change for the $10 bill he was handed and said, "Thanks."

By 6 p.m., in the 3 hours since Al's shift had started, it had gotten very dark. It was quiet; only about a dozen customers had pulled into the station in all that time. Deciding that this would be a good time to clean the restrooms, Al got the cleaning materials out of the storeroom and tackled the job. He had almost finished one of the restrooms when the bell rang to indicate that a customer was out front.

It was a man in a white Pacer with out-of-State plates.

"May I help you?" Al asked.

"Yes," the man replied, "can you tell me how to get to the main highway?"

Al gave him the directions and then asked if he needed any gas.

"No, thanks," said the man as the white Pacer pulled away.

Al headed back toward the restrooms. "If I finish quickly, maybe I can get a little studying done tonight," he thought.

But it was not to be.

"I was tinkering with cars even before I could drive, so in a way this job was made for me."

Just as Al finished mopping the second restroom, the station's bell rang again. The Dodge did not stop at the pumps, but instead parked in front of one of the service bays.

"Can I help you?" Al asked the driver who had gotten out of her car and was walking towards him.

"I hope so," the customer replied. "I've got a flat tire that needs fixing and I have to drive another 100 miles tonight. And I don't think the spare I have on would make it."

Al glanced at the car's left back tire and noticed that it was worn slick. "I wouldn't trust that spare either," said Al. "Let's take a look at the flat."

The customer opened the trunk of the Dodge and Al took the flat tire into the service bay. He filled it with air and slowly let the water trickle over the tire until he came to a spot where he could see bubbles coming off the tire. "Here's the leak," said Al, as he marked the spot with a piece of chalk. Then he took the tire over to a machine that would help him strip the tire from its rim so it could be patched. After patching the tire, Al used the same machine to put the tire back on the rim. He filled it with air and again checked the tire with a trickle of water to be sure it wasn't leaking air.

"I had better put this tire back on your car now," said Al. He was worried about the customer driving on the worn spare. "Do you want to buy a new tire now to replace that spare?"

Al likes dealing with people. "They make life more interesting."

"Perhaps I should," she replied. "How much would that cost?"

"$32.50 plus tax," said Al.

"Okay, I'll take one," said the customer.

Al put the customer's car on the lift in the service bay. Then he removed the worn spare from the car and replaced it with the tire he had repaired. He took a new tire of the same size down from the rack and put it on the rim of the worn spare. This required repeating much the same procedure as he had used to fix the flat. Finally, he put the new tire in the customer's trunk.

"That should just about do it," said Al.

"Great," said the customer. "How much do I owe you?"

Al wrote up the bill which included $3 for fixing the flat, $2 for changing the tires around, $32.50 for the new tire, and $4.25 tax. "The bill comes to $41.75," said Al. "Will that be cash or charge?"

"Cash," she replied, as she gave Al two twenties and a five.

Al gave the customer her change, thanked her, and wished her a good trip. Even though he had missed studying, Al was glad to have helped the woman because he would receive a commission on the sale of the tire. In addition, he got a sense of satisfaction from making the woman's trip safer on this cold, rainy night.

Just as the Dodge was pulling out of the station, a late model Cadillac drove up to the pumps. As Al approached, the driver lowered her window and said, "Would you fill it up with premium, please?"

"Sure thing," said Al. "Shall I also check under your hood?"

"The car seems to be running well, thank you. But maybe you could check just to be sure."

Al opened the hood and proceeded to check the water levels in the radiator and battery, the transmission fluid level, and the oil level on the dipstick. He saw that there was plenty of oil in the car, but it seemed very dark in color. He rubbed his fingers around the oil on the dipstick and noticed that it felt gritty.

"It looks like you need to have the oil changed," Al said. "It really seems dirty and that could harm your engine."

"Are you sure you're not just trying to sell me some oil, young man? After all, I've had this car less than a year."

"Oh no, ma'am, the oil is dirty," Al assured her. "How many miles do you have on the car?"

"Well, it had about 25,000 miles when I bought it, and I've put on another 10,000 miles," the woman replied. "Are you sure the oil is dirty?"

"Yes, ma'am," said Al. "And it should be dirty after

10,000 miles. You should have it changed every 6,000 miles or so."

The woman looked skeptical, so Al just closed the hood and finished filling the car with gas. Before she left, however, she told Al that she was taking the car to a dealer next week to get the air-conditioning fixed and would see what they had to say about the oil change.

As the woman drove away, Al smiled to himself because he was pretty sure that once the mechanics at the dealership explained about changing the oil, the woman would remember him and trust him in the future. In fact, she might well become a steady customer at Simm's.

By this time, Al's shift was almost over and he soon saw his replacement, Chet, pull into the station. He spoke to Chet for a few minutes and then went home to study for his cost accounting class which would begin at a very early 9:10 the next morning.

Exploring

Gasoline service station attendants constantly deal with the public.

- Do you like helping people?
- Do you enjoy speaking with strangers?
- Can you give directions to someone who is lost?
- Can you keep your temper even when people are rude to you?

Attendants must make change and fill out credit card slips rapidly and accurately.

- Are you careful when you do your homework or take a test?
- Are you good at adding and subtracting in your head?
- Is your handwriting easy for other people to read?
- Can you do good work even when you are rushed?
- Do you count your change?

Gasoline service station attendants work outdoors and often get greasy and dirty.

- Do you like outdoor sports and recreational activities?
- Do you prefer outdoor chores such as mowing the lawn to indoor ones?
- Are you willing to get your hands dirty?
- Even though you get dirty, can you keep your work area neat and clean?
- Do you like to put gas in the family car at a self-service gas station?

Gas station attendants make minor automobile repairs.

- Are you handy with tools?
- Do you work on your own bicycle?
- Are you interested in automobiles and how they work?
- Before you start working on something, do you think about how you will go about it?

Suggested Activities

The next time you are in a service station, watch the attendant as he or she services your family car. Ask the attendant to show you how to check the air pressure in the tires. What happens if the tire pressures are not even?

Read the owner's manual for your family car (it's probably in the glove compartment). The manual can show a lot about how a car works. Can you understand the manual? Does it interest you?

Take part in school, religious, or community activities that involve meeting the public, handling money and making change, and writing out receipts.

Ask your parents if you can check the motor oil level in the family car. What happens if the car is driven without enough oil in the motor?

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as automobile mechanics.

Join a chapter of DECA (Distributive Education Clubs of America) if your school has one. DECA clubs aid in the development of good sales habits and techniques, and assist students in obtaining part-time sales jobs while they are still in school.

If you are a Boy Scout, try for merit badges in Salesmanship and Traffic Safety.

Join an Auto Mechanic Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write to a major oil company and ask for information on becoming a gasoline service station attendant or manager.

Exploring Careers

Related Occupations

Gasoline service station work offers good opportunities for people who want to work part time—high school and college students who are unable to hold a full-time job, for example. Fourteen other occupations in which large numbers of students work part time are described below. Try to match the workers with their job titles.

1. Diane sells clothes in the men's department of a large department store.

2. Larry clears the tables of dirty dishes in a downtown restaurant.

3. Jack washes the dishes after Larry brings them to the restaurant kitchen.

4. Sue helps a veterinarian feed and care for animals who must stay overnight at the veterinarian's office.

5. Ann shows moviegoers the way to their seats in a large theater.

6. Bill makes ice cream sodas in the dining area of a large drug store.

7. George returns books to their shelves in a public library.

8. Sarah washes buses for a city bus company.

9. Janet works as a student nurse when not attending classes at nursing school.

10. Greg sells newspapers and magazines at a stand on Main Street.

11. Susan works behind the cash register in a large discount store.

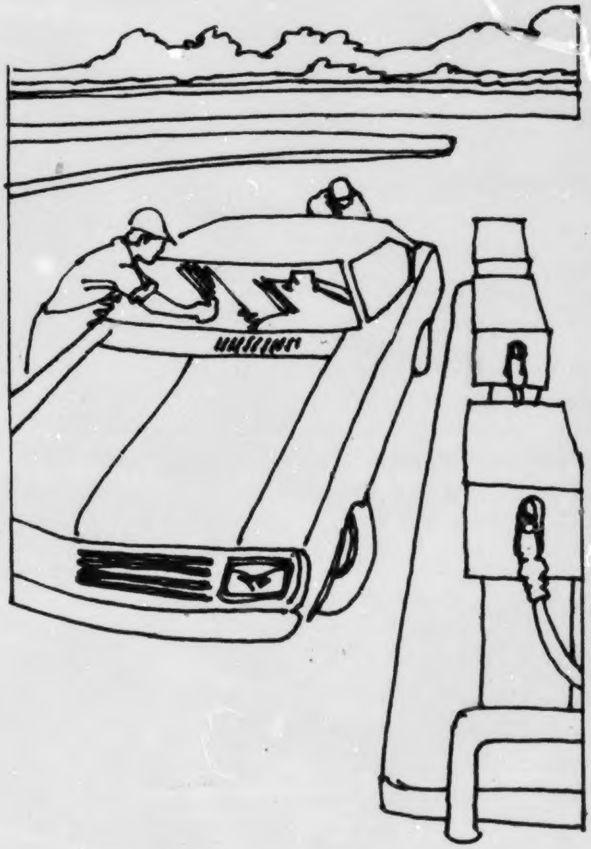
12. Dick operates the Ferris Wheel for a small carnival.

13. Judy delivers messages and carries articles from office to office in a high-rise building.

14. Mary helps stock the shelves in a supermarket.

Newspaper vendor
Retail trade sales clerk
Cashier
Library clerk
Messenger
Animal caretaker
Stock handler
Vehicle washer
Dining room attendant
Dishwasher
Fountain worker
Health trainee
Amusement attendant
Usher

See answers at end of chapter.



Sales Occupations

Job Facts

There isn't room in this book for a story about every sales occupation. However, you'll find some important facts about 13 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Automobile Parts Counter Workers	These workers sell replacement parts and accessories for cars, vans, trucks, and other motor vehicles. They also keep parts catalogs and price lists up to date, unpack incoming shipments, and take care of the paperwork. Most work for automobile dealers and parts wholesalers. Others work for truck dealers, retail automobile parts stores, and warehouse distributors of automotive parts. Trucking companies and bus lines employ counter workers to dispense parts to their mechanics.	Counter workers must know the different types and functions of motor vehicle parts and be able to work with numbers. Because they must identify and locate parts quickly, a good memory and the ability to concentrate on details are desirable. Most learn the trade on the job. Beginners usually start as parts deliverers or trainees. Generally it takes about 2 years to become fully qualified. Employers generally look for high school graduates. Courses in automobile mechanics, math, merchandising, and bookkeeping are helpful.	The work is not physically strenuous, but counter workers spend much time on their feet. At busy times, they may be under some pressure waiting on customers and answering the phone at the same time. Many counter workers have to work on Saturdays as well as weekdays. Some counter workers are members of unions.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Automobile Sales Workers	These workers sell new and used automobiles and trucks. They contact prospects, appraise the trade-in value of the old vehicles, and arrange for financing, servicing, and delivery of the new one. New car dealers employ most automobile sales workers. The rest work for used car dealers.	Most beginners are trained on the job. Many dealers also provide several days of classroom training on the basics of the job. Automobile manufacturers also offer some training programs and may furnish manuals and other materials. A high school diploma usually is required, and some college may be preferred. Previous sales or public contact experience is helpful. High school courses in public speaking, business arithmetic, merchandising, and business law provide a good background. Sales ability, initiative, and self-confidence are essential. The ability to express oneself well is also important.	Sales workers frequently work evenings and Saturdays because customers find shopping after work convenient. Some also work Sundays and take a day off later in the week. Both employment and earnings of automobile sales workers vary from year to year because new car sales are sensitive to changing business conditions.
Automobile Service Advisers	These workers are the link between customers and mechanics in many large repair shops. When customers bring their cars into the service department, service advisers find out what has to be done and arrange for mechanics to do the work. Most work for large automobile dealers that employ from 1 to 4 advisers. Some work for large independent automobile repair shops.	Service advisers are trained on the job and many work their way into adviser positions after starting as auto mechanics or helping the service department dispatcher. Beginners usually can become qualified in 1 to 2 years, but learning to estimate body repairs may take longer. Employers prefer high school graduates over 21 with experience in auto repair. Courses in auto mechanics, commercial arithmetic, sales, public speaking, and English are helpful. Tact is an important quality for service advisers because they sometimes must deal with unhappy customers.	Service advisers are busiest early in the morning when customers bring their cars and late in the afternoon when they return. Many service advisers are members of unions.
Gasoline Service Station Attendants	These workers sell gas and accessories to motorists. They may also check tire pressure, wash automobile windows, and check crankcase oil level. Service station attendants work in gasoline service stations throughout the country.	Applicants should have a driver's license, an understanding of how automobiles work, and some sales ability. They should know simple arithmetic to make change quickly and help keep business records. They receive most of their training on the job. It can take up to a year to become fully qualified. Many high schools offer formal training programs for students in their last 2 years of high school.	Many service stations stay open 24 hours a day, 7 days a week. As a result, work may include evenings, weekends, and holidays. There are numerous opportunities for part-time work, which makes the occupation attractive for students working their way through school and other workers who want to add to their incomes.

Sales Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Insurance Agents and Brokers	These workers sell policies that protect individuals and businesses against future losses and financial pressures. They also help policyholders obtain settlements of insurance claims. About half of the agents and brokers specialize in life insurance while the rest sell liability insurance. A growing number sell both types of insurance.	Most employers prefer college graduates. Courses in sales, accounting, economics, finance, business law, and insurance are helpful. Appropriate personal qualities such as aggressiveness and self-confidence are important. Newly hired workers usually receive training at the agencies where they will work and frequently also at the insurance company's home office. All agents and most brokers must be licensed in the State where they work. Most must pass an examination.	Due to the competitive nature of this field, many workers transfer to other occupations when they are unable to get enough clients to earn a good living. As a result, there are usually numerous openings for individuals with the appropriate personal characteristics.
Manufacturers' Sales Workers	These workers represent companies that manufacture products ranging from computers to can openers. They sell these products mainly to other businesses and to institutions, such as hospitals and schools. Most work out of branch offices, usually in big cities near potential customers. Almost all industries employ manufacturers' sales workers; companies that produce food products employ the most.	Employers generally prefer college graduates. The recommended course of study depends on the product sold. For example, those who work for drug manufacturers usually have studied pharmacy in college. A pleasant personality and appearance and the ability to meet and get along well with people are important. Newly hired workers generally receive formal training from the company before starting the job.	Some manufacturers' sales workers have large territories and do considerable traveling, sometimes on nights and weekends. When on business trips, sales workers are reimbursed for expenses such as transportation and hotels.
Models	Most of these workers model the latest fashion designs and cosmetics. Others pose for a wide variety of products, including cars, soft drinks, and perfume. Clothing manufacturers, designers, and wholesalers employ the largest number of models. Modeling jobs are available in most urban areas, but most are in New York City because it is the center of the fashion industry.	There are no educational requirements for models. Courses in drama, art, and fashion design may be helpful. A model's most important asset is a distinctive and attractive physical appearance. Some models attend modeling schools and a few promising beginners receive training from agencies. Female models must be at least 5 feet 7 inches tall and weigh no more than 120 pounds. Male models must be 6 feet tall and wear a size 40 suit. Most agencies require that models obtain a portfolio of photographs of themselves.	Models sometimes must work under uncomfortable conditions—posing in a swimsuit in midwinter, for example. Competition for modeling jobs is very keen.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Real Estate Agents and Brokers	Real estate agents and brokers represent property owners in selling or renting their property. Most work for small real estate firms, but a few work for builders to sell homes in a particular development. Real estate is sold in all areas, but employment is concentrated in urban areas and smaller, but rapidly growing, communities.	High school graduation is generally the minimum requirement. Many employers prefer college graduates. Courses in math, business law, real estate, and finance are helpful. Many colleges and universities offer degrees in real estate. Personality traits are fully as important as academic background. Real estate firms look for applicants who have a pleasant personality and neat appearance. Maturity, tact, and enthusiasm for the job also are important. Many firms offer formal training programs for real estate sales workers. All States and the District of Columbia require sales workers and brokers to pass a written examination and to be licensed.	Agents and brokers often work evenings and weekends to suit the convenience of customers.
Retail Trade Sales Workers	In addition to selling, these workers make out sales or charge slips, receive cash payments, and give change and receipts. They also handle returns and exchanges of merchandise and keep their work areas neat. Most work in retail stores ranging in size from small drug stores to huge department stores. They also work for door-to-door sales companies and for mail-order houses. Jobs are available in almost every community but most sales workers are employed in large cities and nearby suburban areas.	Employers prefer high school graduates. Some high schools have programs that teach the principles of retail selling. Most sales workers learn their skills on the job. In large stores, training programs for newly hired workers usually begin with several days of classroom instruction followed by on-the-job training under the supervision of an experienced worker.	Because Saturday is a busy day for stores, employees usually work that day and have a weekday off. Sales workers may work very long hours before Christmas and during other peak periods. There are many opportunities for part-time employment during peak periods.

Sales Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Travel Agents	Travel agents help their customers plan trips. They suggest itineraries and points of interest, make hotel reservations, arrange for transportation, and handle other details. In making arrangements, they consult fare schedules and fact sheets for hotel ratings and other tourist information. About one-half of all travel agencies are located in large cities, one-third are in suburban areas, and one-fifth are in small towns and rural areas.	Most agencies provide either formal or informal on-the-job training programs for their agents. Working part time or during summers as a reservation clerk or receptionist in a travel agency provides useful experience. Several home study courses also provide a basic understanding of the travel industry. Since the ability to speak of personal experiences frequently helps influence customers' travel plans, broad travel experience is an important qualification. Travel agents should have pleasant personalities and patience. Agents should be efficient and responsible. High school courses in geography, foreign languages, and history are helpful.	One travel agent in four is self-employed. However, agents going into business for themselves should be prepared for low earnings for the first few years they are in the business. Travel agents frequently travel at substantially reduced rates. Sometimes a hotel or resort will offer a travel agent a free holiday. Many agents, especially those who are self-employed, frequently work overtime.
Wholesale Trade Sales Workers	These workers sell for wholesale houses that distribute goods to retail stores and consumers. Many are employed by wholesalers or distributors who handle machinery, building materials, food products, drugs, drygoods, motor vehicle parts, or electrical appliances. Wholesale houses usually are located in big cities, but sales workers may be assigned territories in any part of the country.	High school graduation is the usual requirement although some sales jobs require college training. Courses such as commercial arithmetic and merchandising are helpful. Selling certain products requires more specialized training. Those who work for drug wholesalers, for example, would find courses in biology, chemistry, and pharmacy helpful. Workers usually begin as trainees and are trained in nonselling jobs before being assigned to sales. Trainee programs usually involve classroom instruction as well as rotations to nonselling jobs. Generally 2 years or longer are required before trainees are ready for their own territories.	Sales workers often have long, irregular work hours and frequently have to travel in their work. Most companies provide cars for their sales workers or reimburse them for their expenses while on the road.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Route Drivers	These workers sell and deliver goods and services such as dairy products and drycleaning directly to customers. Most work for small companies that distribute food products or provide personal services, for example, dairies, bakeries, food and beverage distribution firms, and drycleaning plants. Jobs are available in small towns as well as in large cities.	Most States require that route drivers have a chauffeur's license. Most employers prefer applicants who are high school graduates and over 25 years of age. Courses in sales techniques, public speaking, driver training, and bookkeeping are helpful. Some large companies have classes in sales techniques, but training is mostly on the job.	Route drivers have to make deliveries in all kinds of weather and do considerable lifting, carrying, and walking. Many start work very early in the morning. For many route drivers, the fact that they do not work under close supervision is an attractive part of the job.
Securities Sales Workers	These workers buy and sell stocks and bonds for individuals. They also give market advice, and keep records on customer accounts. Securities sales workers are employed by brokerage firms, investment banks, and mutual funds in all parts of the country. Most, however, work for large firms with offices in big cities.	Employers prefer college graduates with degrees in business administration, economics, finance, or liberal arts. Successful sales or managerial experience helps because many employers look for specific personality traits and signs of sales ability. Most States require persons who sell securities to be licensed and registered. Examinations and character investigations are required for registration. Most employers provide training to help sales workers meet the requirements for registration.	Securities sales workers work fairly regular hours although they may meet with customers on evenings and weekends.

Answers to Related Occupations

SECURITIES SALES WORKER

1. Insurance agent and broker, 2. Real estate agent and broker, 3. Automobile sales worker, 4. Yacht broker, 5. Security analyst, 6. Order clerk, 7. Margin trader, 8. Bond trader.

AUTOMOBILE PARTS COUNTER WORKER

1. Manufacturer's representative, 2. Automobile sales worker, 3. Automobile service adviser, 4. Automobile mechanic, 5. Gasoline service station attendant.

GASOLINE SERVICE STATION ATTENDANT

1. Retail trade sales clerk, 2. Dining room attendant, 3. Dishwasher, 4. Animal caretaker, 5. Usher, 6. Fountain worker, 7. Library clerk, 8. Vehicle washer, 9. Health trainee, 10. Newspaper vendor, 11. Cashier, 12. Amusement attendant, 13. Messenger, 14. Stock handler.

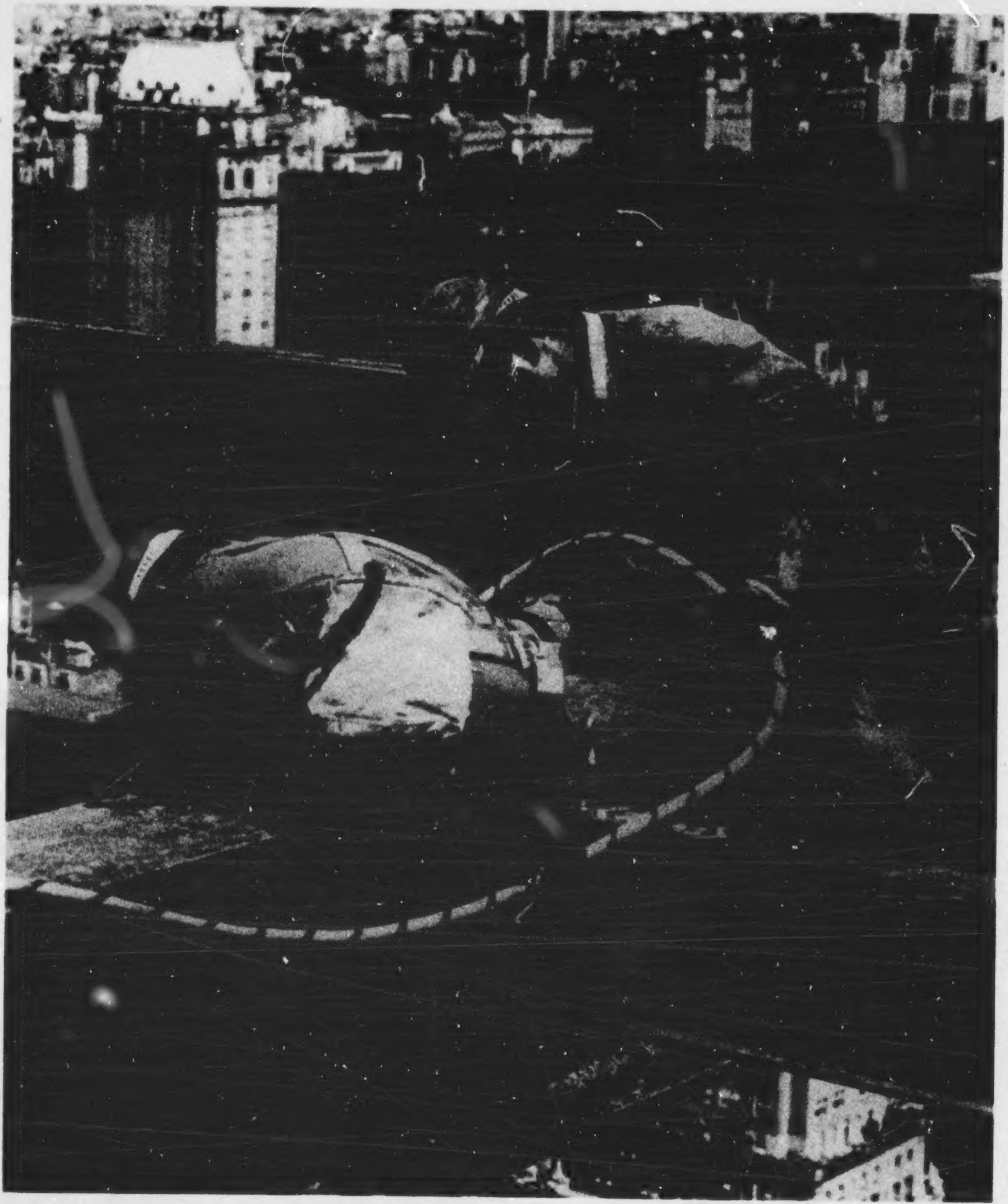
Answer to math problem

SECURITIES SALES WORKER

AC&C, American Railroad Co., and D.C. Electric Co. would provide a higher yield than the savings account.

Exploring Careers

Construction Occupations



Ironworkers high above the city are protected by a system of belts and ties.

Exploring Careers

We live in a world of structures of all kinds: Houses, stores, bridges, factories, roads, and schools. Think about your community for a moment and see how many different structures you can name.

Putting up a building requires the effort of people with many different skills. At every stage, from clearing the site to putting on such finishing touches as signs or door knockers, construction means a team effort. Although the members of this "team" aren't all on the site at the same time, they depend on each other. To get an idea of how this works, let's see what's involved in building a house. We'll follow the progress of the Wright family's house, which you'll read more about in the story about the architect in the chapter on Performing Arts, Design, and Communications Occupations.

Before the Framework Goes Up

A lot had to be done before the house could begin to go up. First, the Wrights' *architect*, Jack Myers, had to design the house and draw up blueprints for the construction workers to follow. Blueprints are plans that show the general layout of the building and give such detailed information as the exact measurements of rooms, windows, and doors and the places where pipes, wires, and ducts should be placed.

Then the builder, or *contractor*, had to obtain all the materials, equipment, and labor. It's the contractor's job to make sure that every phase of the work is done on schedule, so that the house will be finished when the Wrights are ready to move in. This means checking to make sure that the job is being done properly and maintaining an inventory of supplies so that workers don't waste precious time waiting for materials to be delivered. The contractor already has obtained the building permit, a legal document that is required before construction can begin. The permit shows that the Wright house meets county zoning regulations for the site where they plan to build. Several months ago, after obtaining the building permit for the Wrights' house, the contractor hired a *surveyor*. The surveyor measured the land and drew maps that showed boundary lines and such features as roads and underground utility lines.

What else has to be done? The land must be prepared. That will happen soon, for the *operating engineers* are scheduled to arrive tomorrow with their bulldozers and other earth-moving equipment. A hill will have to be leveled and, in spite of the Wrights' desire to save them, several trees will have to be cut down.

The operating engineers are among the first construction workers on the site. Helping them are *construction laborers*, or "helpers", who have work to do during nearly every stage of the building. Once the operating engineers have prepared the ground, the surveyor will come back and use stakes and lines to lay out the exact location of the house on the property.

The Structure Rises

Once the land is ready, it will be time for the foundation to be laid. A building as heavy as a house rests on a foundation buried in the ground. This is done so that the weight of the building will rest on the hard, solidly packed ground below the frost line. Otherwise it might develop structural damage, such as cracks and doors and windows that won't open.

The foundation starts with "footings"—large blocks of concrete that are completely sunk into the ground. Footings are placed under the edges of the house and at certain points inside where there will be extra weight—under a fireplace or porch, for example. The first step in laying the foundation is digging trenches for the footings. An excavation crew of operating engineers will dig out, or excavate, the earth to make room for the footings. Then *cement masons* will pour wet concrete into the trenches. Pouring concrete is hard work that requires strength and stamina. Sometimes this job is done by a crew of construction laborers rather than by the more highly skilled cement masons. Once the concrete is set, bricklayers will come in and place cinder blocks on top of the footings and build the foundation wall to slightly above the ground surface.

Then it's time for utilities to be brought in from the street. Such utilities as water, sewerage, and gas are brought to individual houses by means of undergound pipes called mains that run beneath the streets. The floor of a new house cannot be laid until these water, sewer, and gas mains are tapped and connecting pipes attached that will lead into the house.

After the utility pipes have been brought up through the ground inside the outer boundary of the house, cement masons will pour a slab floor. They will pour the concrete carefully, making sure it is level, and smooth it down as it hardens to give it an even finish. They'll keep the concrete moist while it's "curing" to make sure it will be hard and strong when it dries. It's not unusual for cement masons to work overtime, because once the concrete is poured they must stay on the job until it is completed.

With the foundation and slab floor in place, *carpenters* can begin work on the wooden frame of the house. Carpenters follow the architect's blueprints when they build the frame. They use different sizes of lumber: Studs for the walls, joists for the attic floors, and rafters for the

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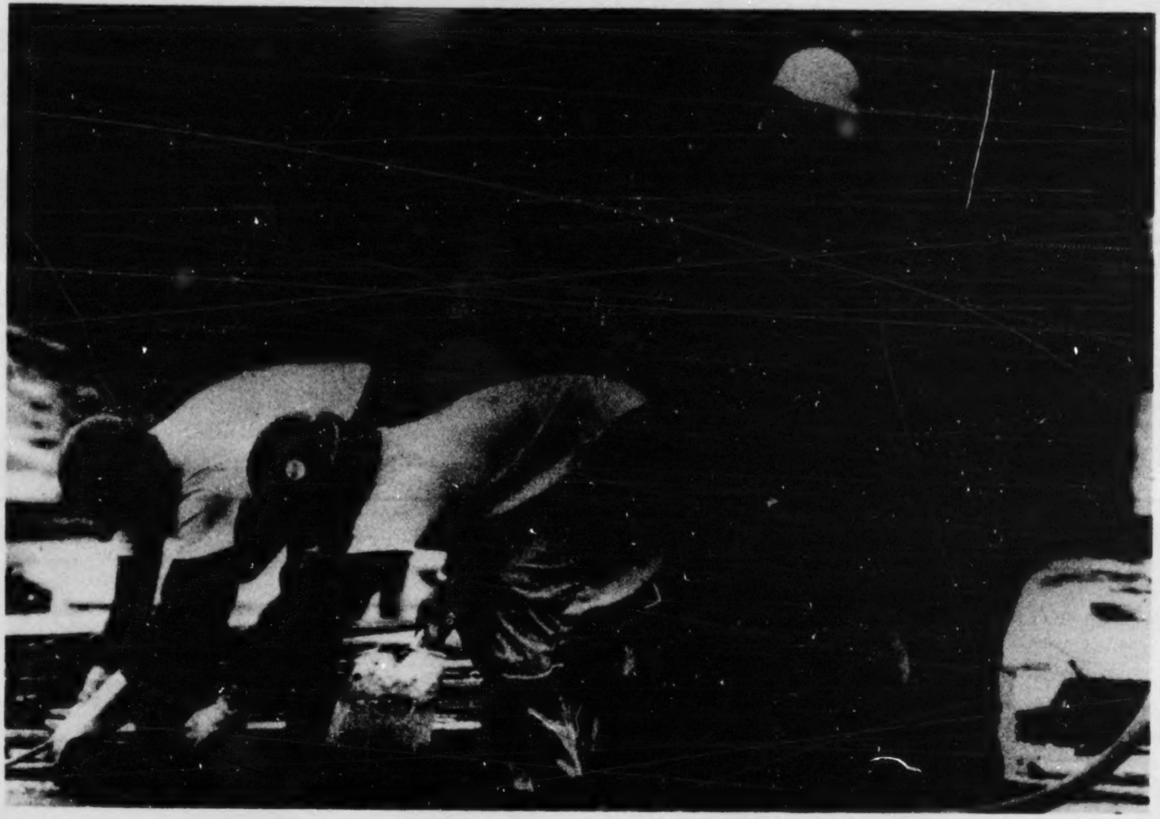


Laying concrete is a team effort.

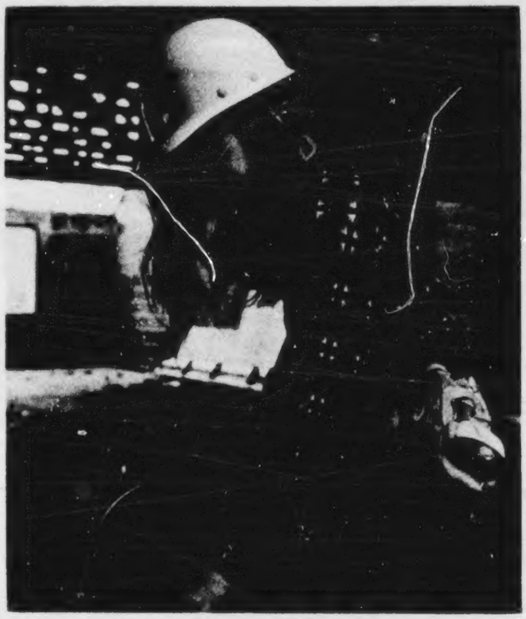
roof. They will begin by building the wall framework, nailing pieces of lumber together and securing them to the foundation with metal bolts. The carpenters must be sure to place the studs a certain number of inches apart, as called for in the building code. They must be sure to leave spaces for windows and doors.

As soon as the wall frame is up, the carpenters will build the attic floor frame and the roof frame. On top of the roof frame they'll place sheets of plywood called roof decking. Then *roofers* will come in and put roofing felt or tar paper on the roof deck. Since the architect decided long ago that asphalt shingles would be best for the Wrights' house, that's what the contractor has bought. When the time comes, the roofers will put them on. The roofers will also add gutters, downspouts, and flashing around the chimney and edges of the roof to prevent water from running down the sides of the house when it rains.

Once the roofers have finished, it will be time to put up the outside walls of the house. As the first step, carpenters will nail sheathing boards across the outside of the wall frame. They also will install windows at this stage. When the windows and sheathing board are in place, the outside walls can go up. The Wrights' house will have brick on the front and sides, and aluminum siding on the rear.

Bricklayers will lay the brick. They will have to be sure that the walls are straight and level and that they intersect at right angles. The bricklayers must follow the architect's blueprints very carefully. They have to pay attention to every detail, making sure that the rows of brick line up with doors a[illegible]ys, for example. Helping them will be *hod c[illegible] mason tenders* who mix the mortar and make sure the bricklayers don't run out of materials.

The aluminum siding for the rear of the house is made at the factory, but the carpenters who install it measure and cut it at the job site. They nail the panels in place and add molding at corners and along windows and doors to give a neat finish.



Carpenters work quickly and accurately with hand tools or power tools.

Precision measuring instruments are required in some construction trades.

A mask protects this plumber's eyes when she is welding.

Construction offers good opportunities for young people who are willing to spend several years learning a trade.

Construction Occupations

Moving Indoors

All the workers you've read about so far have outdoor jobs. Working together, they'll build the "shell" of the Wrights' house. But there still will be a lot to do before the family can move in.

You've seen how the water, sewer, and gas mains will be tapped before the slab floor is laid down. Until more work is done, the ends of pipes will simply stick out of the floor in the utility room, kitchen, and bathroom. When the time comes, *plumbers* will come in and install the fresh water pipes and the drainage system within the house. They will put pipes inside the walls before closing them up on the inside so that the pipes aren't visible when the house is finished.

Plumbers will install heating and air-conditioning units, too. The Wrights will use electricity to heat their house. Warm air will be sent throughout the building by means of a system of thin-walled rectangular pipes called ducts. *Sheet-metal workers* have already made the ducts at the shop; later they'll bring them to the construction site to install them. The sheet-metal workers will install ductwork inside the walls and ceiling, making sure that there are outlets or registers in each room. They also will install return air ducts so that the air will circulate back to the air conditioner or furnace.

Since both the plumbing and the ductwork are installed inside the walls or ceiling, they're hard to get at once the house is finished. For this reason, the plumbers and sheet-metal workers will have to be very careful to install the pipes and ducts correctly in the first place. They may have to work in awkward or cramped positions to do this.

Another important utility that will be installed is electricity. To do this, *electricians* will connect a cable from the street to the house. They'll bring the cable to the house and attach it to a meter, which measures the flow of electricity, and then to a distribution panel. From this panel the electricians will connect more wires that lead to electrical outlets and switches all over the house. The electricians run these circuit wires inside the walls and ceiling and floors, being careful not to let them interfere with the metal ductwork or plumbing system.

To save energy and keep the house warmer in winter and cooler in summer, insulation will be applied to the insides of the outer walls and to the attic floor. Insulation also helps absorb noise and prevents water vapor from passing through the walls. *Insulation workers* will cut strips of fiberglass or other insulating material to the right length, and then staple each strip into place inside the wood framework. They also will cover the ducts and pipes that carry hot air or water.

Like many construction workers, this painter has his own contracting business.

After the utilities have been roughed in and the insulating materials installed, the finishing work can begin. There will be a lot for the finishing workers to do, for the inside of the house will be no more than a wooden skeleton.

Drywall installers will close up the walls and ceilings by nailing wallboard panels to the wooden framework inside the house. They will cover all joints and nail holes with tape and joint compound, and make sure the surface of the wallboard is smooth and ready for painting.

Years of experience enable this floor installer to work quickly.

Once the wallboard has been installed, *painters* will arrive on the scene. The painters will paint the walls and ceilings, using brushes, rollers, or spray guns. They need to know the characteristics of different paints, and how to mix different colors. Since Mr. and Mrs. Wright want wallpaper on the bedroom walls, *paperhangers* will be needed too. Both the painters and the paperhangers must be skilled at what they do so that they can work rapidly but neatly.

Floor covering installers will be on the job then also. These workers will finish the floors by putting hardwood, resilient tile, or carpeting on top of the concrete slab floor. *Tilesetters* will come in to lay ceramic tile on the floors and walls of the bathrooms.

Finishing carpenters will install the interior wooden trim: Casings around windows and doors and base and shoe moldings where the walls meet the floor. The finishing carpenters also will hang the doors, being careful to make sure each door is the right size and that it hangs straight.

Fixtures and accessories will have to be installed. The plumber will return to put in sinks and bathroom fixtures such as bathtubs and toilets. Finishing carpenters will install kitchen cabinets and counter tops. The electrician will come back to install overhead lights and light switches. The painter will return to finish the hardwood floors, the trim, and any marred or damaged areas.

Various finishing jobs often overlap, so cooperation is essential. The different craftworkers will have to be careful not to get in each other's way or spoil the work that others have done. All of the finishing work affects the final look of the house, and therefore requires careful attention to detail.

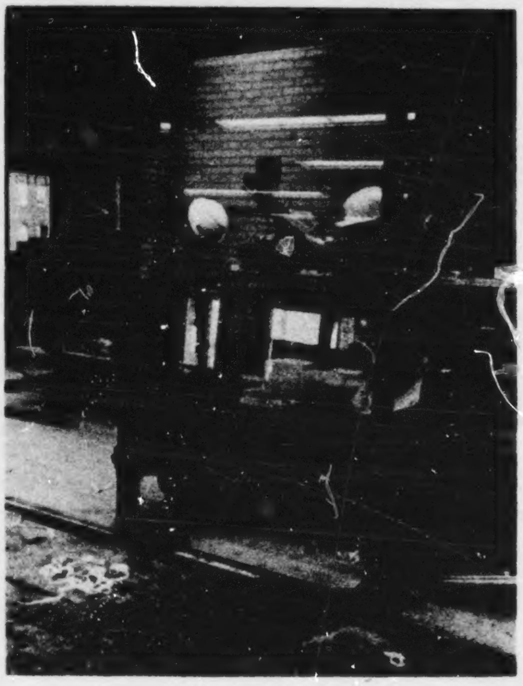
As the inside of the house nears completion, cement masons will return to lay the sidewalks and driveway. A *landscaper* will come in to plant grass, shrubs, or small trees. And then one last step is necessary. A crew of construction laborers will clean up the inside of the house and the work site, and carry away debris left by the finishing workers. Finally, the house will be ready for the Wrights.

Other Jobs in the Building Trades

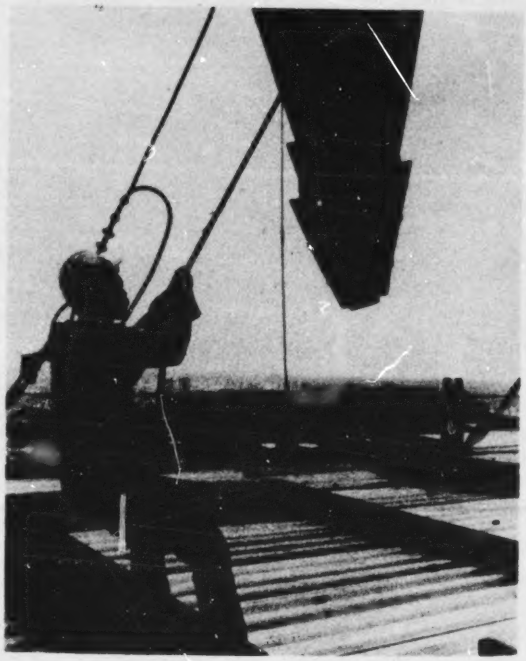
A large project such as a high-rise apartment or an office building requires many more workers than a house. Furthermore, it requires some very specialized workers. On construction projects as large as these, there are jobs for *elevator constructors*, workers who install elevators in high-rise buildings. And jobs for *glaziers*, who install glass on wall surfaces or put in windows. *Ironworkers* erect the steel framework and other metal parts in big buildings, bridges, and other structures. Plaster, rather than drywall, is used to cover walls and ceilings in many commercial buildings. Before any plastering is done, *lathers* install supports such as metal lath or gypsum lath board to hold the plaster, stucco, or concrete materials. *Plasterers* then finish interior walls and ceilings with plaster coatings and apply durable cement plaster or stucco to exterior surfaces. *Marble setters* install marble facing on walls, columns, and floors. *Terrazzo workers* apply terrazzo to floors in buildings such as stores, offices, and hospitals. Terrazzo is tinted concrete with which marble chips are mixed.

What it Takes to be a Construction Worker

As you have just seen, construction takes a team effort. Much of the work takes place one step at a time, and almost every step depends on another having been completed. Cement masons cannot pour concrete footings, for example, until the land has been cleared and trenches have been dug. Carpenters cannot begin nailing up the wall framework until the foundation has been laid. Walls cannot be finished until utilities are installed. Each worker depends on others doing their jobs well and without delay. Since it takes the skills of many different



Glaziers install all types of building glass.



Many people like the physical activity of construction jobs.

people to put up a building, *construction workers must be able to work well with others.* They must be willing to take orders from those in charge, do their share of the work, and cooperate so that no one gets in anyone else's way.

What other traits are important for people in the building trades? For plumbers, painters, electricians, carpenters, bricklayers, and others whose work requires a high degree of skill, a talent for *working with one's hands* is important. It takes manual dexterity to work quickly and accurately with handtools such as the trowels, hammers, mallets, and chisels that bricklayers use. Or to cut and shape wood with portable power saws and drills as a carpenter does. Do you like working with your hands? Are you good at working with tools or machinery? Are you mechanically inclined? These qualities are essential in the building trades.

Skilled construction workers often are called upon to *solve mechanical or structural problems.* A tilesetter might be asked, for example, to create an intricate design in tile for an outdoor patio. With general guidelines from the architect, a plumber might have to plan the layout of a plumbing system for a specific room to make the best use of limited materials and space. Coming up with a workable solution requires that the worker know a great deal about his or her craft. It takes expert knowledge of both the theoretical and practical aspects of a craft or trade to figure out the best way of handling a particular problem.

Much construction work requires *precision.* Workers such as electricians and plumbers must meet strict standards of accuracy in their work; they need to be able to take measurements and calculate dimensions quickly and accurately. This is such an important aspect of construction work that apprenticeship programs generally include one or more courses in applied mathematics.

Many construction workers need to be able to *picture objects from blueprints* and read scale drawings. Also important is an *eye for detail*—the ability to see slight differences and detect flaws in shapes or surfaces. Painters in particular require good *color discrimination* in order to match colors and shades, and to select those that go well together.

Many people prefer construction work because it so often is *outdoor work.* Working outside is enjoyable when the weather is nice, of course. But construction workers have to be prepared to work outside on days when the weather is terrible. Do you spend a lot of time outdoors right now? Would you be willing to work outside in cold or very hot weather?

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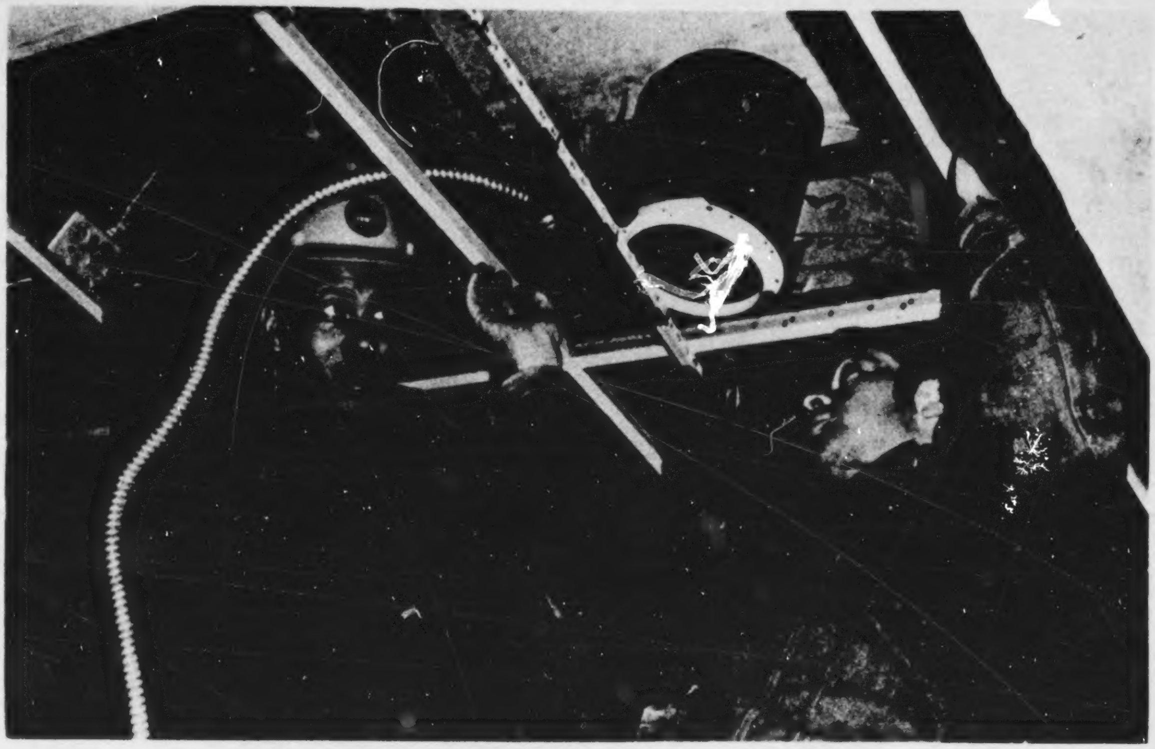

A 4-year apprenticeship program is the best way to become an electrician.

Finally, every aspect of construction work involves *physical activity*. If you like exercise, one of the construction trades may be just right for you. A willingness to be physically active on the job certainly is a "must" for anyone interested in entering the field, for people in the building trades do a lot of standing, stooping, bending, squatting, stretching, or kneeling. Some construction workers do a great deal of heavy lifting. Moreover, they don't get much time to rest. They must keep moving all the time, working steadily. Depending on the job, construction work can take a lot of strength and stamina.

What the Job Offers You

You've just read about personal traits that are important for construction work. There are other things to consider as well. What about wages? Chances for promotion? Steadiness of the job? Opportunities to go into business for yourself?

The building trades generally offer high hourly pay. Being paid by the hour means that the total earnings of construction workers are affected by how many hours they work. During good times, there's lots of work for everyone. Since construction workers receive extra pay for overtime work, they sometimes can make a lot of money by working overtime to finish a project by a certain deadline.

On the other hand, in construction there's no promise of steady employment. Some construction workers are employed for years by a single contractor, but others must seek a new job after each project is completed. And even if you work for a single contractor, you can't always be sure how many hours you'll work. Construction activity often swings from highs to lows. Building generally is curtailed in the winter when it's very cold, snowy, or rainy. Fewer new homes are built when the economy is in a slump. Work on a big project may stop altogether because of a business failure. A delay in obtaining building materials can lead to temporary layoffs. In these cases being paid by the hour means not getting paid at all for time you don't work. If you're considering construction work, you should be prepared for periods when your income would be uncertain.

Construction Occupations

The building trades offer an opportunity to work your way up to a supervisory position, particularly for workers who are ambitious, and good at what they do. Experience also improves chances for promotion. An experienced worker might be promoted to a position supervising other workers of that craft. After several years he or she might become a construction superintendent, and then perhaps a project manager. Many people in the building trades eventually begin businesses of their own. This is especially true of carpenters, floor covering installers, painters and paperhangers, plasterers, and tilesetters. As their businesses expand, they may employ other workers and become contractors. Sometimes construction workers move into office positions as estimators.

Training

How do people enter the building trades? What do you need to know to get a job? Most construction workers are skilled craftworkers. They learn their trade through several years of on-the-job training—or by completing an apprenticeship or other training program that may take as long as 4 years. Individual training requirements for each of the construction occupations are listed in the Job Facts at the end of the chapter.

Apprenticeship programs, offered by local union and employer groups working together, are a good way of learning one of the construction trades. These programs combine actual work experience with classroom instruction, and may last anywhere from 2 years (cement masons, drywall installers, lathers) to 4 years (carpenters, electricians, glaziers, insulation workers, plumbers, and sheet-metal workers). "Apprenticeship" comes from a French word meaning "to learn", and if you choose this way of training for a trade, you'll need to be serious about learning.

Not everyone trains for construction work in an apprenticeship program, however. Many people learn the construction trades on the job, by working with experienced construction workers in their community. A summer construction job while you're still in high school can be a good way to find out if you're suited for this work.

Construction offers good opportunities for young people who are willing to spend several years learning a trade. Most high schools offer classes in mathematics, mechanical drawing, drafting and design, and shop. Many have programs in the building trades, and offer courses in bricklaying, carpentry, electricity, plumbing, heating and air conditioning, and general maintenance mechanics. These classes provide good experience, because you work with the same kinds of machines and tools in class that you'd use on the job. Such high school courses may give you the skills to land your first job or open the way for further training. Some programs give building trades students an opportunity to participate in the construction or renovation of houses through actual on-the-job work experience.

Many people choose construction work because of the high hourly pay.

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Bricklayer

Andy considers himself lucky to get into the apprenticeship program. "I'm being paid good money to learn a highly skilled trade."

Construction Occupations

Andy walked onto the site and saw Joe, the bricklayer supervisor, examining some blueprints. "Hi," he said, yawning as he approached. "What time is it? This site *would* have to be way on the other side of town. I had to get up an hour and a half earlier than usual this morning to allow enough time to get here."

The supervisor look up, glanced at his watch and said, "It's 7:15. I'm glad you got here a little early today. You can help me lay out these walls."

Andy was an apprentice bricklayer. At the age of 23 he was more than halfway through his 3-year apprenticeship program. The program had two parts: On-the-job training every day and classroom instruction 2 nights a week.

Andy considered himself lucky to have been accepted for apprenticeship. First there had been the aptitude test, and then the oral interview with the union apprenticeship committee. The committee had asked him about his school record, his interests, his hobbies. The last question had been the hardest: What makes you think you'd be a good bricklayer? Andy had passed the interview with flying colors, but even then he had to wait nearly a year before there was an opening. The apprenticeship committee accepts people into the program only a few at a time—it all depends on the amount of construction activity in the area, and the need to train more bricklayers. The committee tries to train only as many bricklayers as there are jobs.

Andy was pleased with the way things were going for him. He was learning a skill and getting paid while learning. Every 6 months since he had started, the apprenticeship committee had examined his progress, and each time they'd promoted him and raised his pay. When he had first started the program he had been paid only about half the usual hourly wage for experienced bricklayers, but the amount had been increasing steadily. Soon he'd be making as much as any experienced bricklayer. Andy knew that with the apprenticeship committee constantly reviewing his progress he couldn't afford to waste time on the job, or skip classes, or be late for work. So there he was even though he'd rather have been home in bed.

That morning Andy and the other bricklayers in the crew were to begin laying the exterior walls of a high-rise apartment building. Andy had learned long ago that there's more to being a bricklayer than just slapping bricks together in a haphazard fashion. Bricklaying, he had discovered, is a precise activity, and there is a lot of measuring to do before the first brick is laid.

The bricklayer supervisor must study the architect's blueprints and compare the dimensions indicated there to the actual surface on which they're working. The blueprints tell the length and width and height of the walls to be built and the kinds of materials to be used. They show the size and locations of doors and windows, the pattern in which the bricks or blocks are to be placed (known as the pattern bond), the number of units needed for a row or "course" of brick or block, and the size of the joints between units. The bricklayers need all of this information before they can begin laying any bricks or blocks.

Andy walked over to look at the architect's blueprints with Joe. Right away, he saw that the wall they were about to build was a composite wall. This meant that the wall was to be made of row upon row of cement block faced with rows of brick. The parallel rows are called wythes. The brick facing and block backing would be bonded with metal wall ties at regular intervals for added strength. The architect had specified exactly what types of brick and block and wall ties to use.

The first step in laying out such walls as these is marking the dimensions on the foundation. Andy and Joe began measuring in from one of the corners of the foundation. They checked the dimensions of the foundation against the dimensions given in the blueprints.

"Let's start laying the bricks out dry," Joe said.

The two bricklayers laid a course of bricks without mortar in order to space them correctly. Then Joe marked the spaces where there were to be doors and windows to make sure that the units would be placed properly around those openings to allow for a strong bond.

Andy got up from his kneeling position and looked at the layout. "It looks pretty good," he said. Joe nodded.

By now the other bricklayers had arrived. In addition to Andy and Joe there were six bricklayers and eight helpers, called mason tenders or hod carriers.

"You'll be working with Fred," Joe told Andy. "He's been doing this for a long time, and he'll be able to help you out if you have any problems." Joe made sure that all of the other bricklayers saw the markings for the doors and windows.

A mason tender brought a batch of freshly mixed mortar, and the bricklayers picked up their trowels. Fred moved to one of the corners. He cut into a pan of wet mortar with his trowel, spread the mortar thickly on the foundation surface, and then pressed a brick into place. He picked up another brick, "buttered" one end of it with mortar, and pressed it into place next to the first brick. After placing each brick in place, he used his trowel to cut off the excess mortar that had been squeezed out from the brick joints.

Andy watched Fred for a while, admiring the single flowing motion with which he loaded the trowel and spread the mortar. Then he stepped up and began helping the other man. Together, they built the outside corner

"There's a lot of more to being a bricklayer than just slapping bricks together. It's very precise work."

of brick, and inside it another one of block. The other bricklayers had split up into smaller groups and had moved to other sections of the building. There they were building corners just as Fred and Andy were doing.

It didn't take long for the crew of bricklayers to build the corners to the desired height. Then they began to lay the brick wall between the corners. First they stretched a line betwen the corner units at the top of the first course. The line was a guide for keeping the bricks all at an even height, as well as for keeping the row straight. Then they began laying the first course of bricks. On top of the first course they laid a second, then a third, and so on until the wall was six courses high.

The motions involved in laying brick are repetitive, and soon Andy was moving at a quick pace. Andy and Fred talked for a while about the upcoming World Series, but then lapsed into silence. "It's nice to be able to talk and let your mind wander while you're working," thought Andy as he listened to some of the other bricklayers joking with each other. The other people on the job really helped make the work enjoyable.

When they finished the sixth course of the brick wall, Andy stopped and examined the work he and Fred had done so far. His arms and back were tired from stooping over and lifting the bricks, but he was pleased with the wall. The sight of the finished brick work made him feel good. The mortar joints between courses still needed to be finished, so Andy picked up a tool called a jointer and ran it along the edge of each joint. The jointer left an indentation in the mortar that made the joints look much neater than before.

The sun was very strong now. Andy could feel it burning his face and arms. His shirt was soaked with perspiration. There wasn't much shade around, nowhere to escape from the heat. "Isn't it lunchtime yet?" Andy wondered.

Minutes later, Joe called out, "Let's break for lunch now. You have half an hour." Then he walked over to Andy and Fred and examined the work they had just completed.

"When we get back," he said, "we'll lay the block backing inside the brickwork."

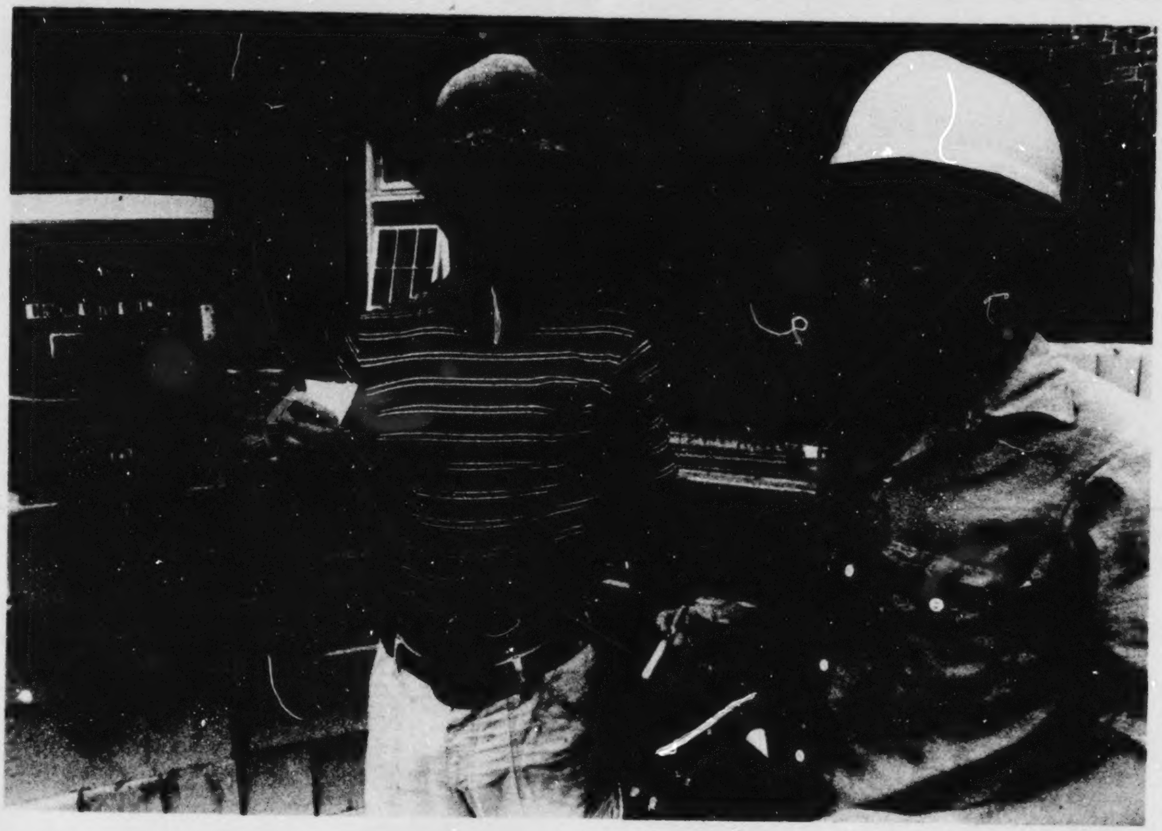
Andy nodded. Then he looked over at Fred, who grinned and said, "Let's find some shade to sit in so we can cool off. I've got to get out of the sun for a while. And the way you've been working, you must be pretty hot and tired yourself. You're not so bad, you know."

"Thanks," Andy replied, flashing a broad smile. Then the two bricklayers walked off to pick up their lunch bags.

Exploring

Bricklayers work with their hands. They use handtools such as trowels, hammers, and chisels. Sometimes they use power tools.

- Do you enjoy activities that involve working with your hands, such as building ships or airplane models, building or refinishing furniture, making ceramics, weaving, doing macrame, making stained glass, or making candles?
- Are you accustomed to using tools for work around the house or garden, or for repairing bicycles or lawn mowers?
- Do you help put up shelving, install screens or storm windows, replace loose shingles, or fix loose boards or stair railings?
- Do you enjoy learning how to use a tool you've never used before?



"Talking and joking with the other bricklayers is one of the best parts of this job."

Bricklayers follow blueprints and diagrams.

- Can you read and understand graphs, diagrams, and charts?
- Can you read roadmaps?
- Can you look at a drawing and picture the three-dimensional object in your mind?
- Do you understand football or basketball plays when they're written out?
- Can you follow the diagrams in the service booklet for a refrigerator, air-conditioner, or dishwasher?

Bricklayers need a working knowledge of mathematics.

- Do you know how to take measurements and calculate fractions, proportions, and percentages?

Bricklayers do strenuous outdoor work. The job involves a lot of lifting, standing, and stooping.

- Are you in good physical condition?
- Do you enjoy outdoor sports and recreational activities, such as football, baseball, softball, track and field, hunting, fishing, climbing, hiking, or camping?
- Do you prefer mowing the lawn or working in the garden to working indoors?

Suggested Activities

Help build an outdoor masonry structure such as a retaining wall or a barbeque pit. Help lay a terrace or patio. Help lay a brick or stone walkway.

Invite a bricklayer or stonemason to speak to your class about his or her work. Ask the speaker to bring and explain some of his or her tools.

Exploring Careers

Invite a representative of the local bricklayers' union to speak to your class on apprenticeship opportunities in your community.

Invite the instructor of a bricklaying course to speak to your class about training opportunities and job prospects for bricklayers in your community. Most school systems have vocational education programs that offer instruction in the building trades. Courses also are given in community colleges, technical institutes, and trade schools.

Join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as bricklaying, carpentry, and the electrical trades.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops also offer opportunities to test career interests through proficiency badges in a number of areas including Handywoman.

If you are a Boy Scout, try for the merit badge in Masonry.

As a project for a mathematics class, plan a wall to be built of brick or block. This involves deciding on dimensions, pattern bond, and size of joints.

Bricklayers need a working knowledge of mathematics. They need to be able to take measurements and do calculations. See if you can do the problems below. They are typical of some of the problems bricklayers deal with every day.

- A bricklayer is planning to build a wall using standard size bricks that are 8 inches long, 4 inches wide, and 2¼ inches high. There will be ½ inch of mortar between each brick. How long a course can she build with a load of 25 bricks?
- A bricklayer lays 80 bricks per hour. How many hours does it take him to lay 960 bricks? How many 8-hour days is that?
- A bricklayer is planning a wall that is to be 10 feet high and 40 feet long. If seven bricks equal 1 square foot of wall, estimate the number of bricks the job will require if you allow 10 percent for waste.
- It requires ⅝ of a cubic yard of mortar to lay 1,000 bricks with ½-inch mortar joints. Assume that seven bricks equal 1 square foot. How many cubic yards of mortar are needed to build a wall 200 feet long and 10 feet high?

See answers at end of chapter.

Write for career information to the International Masonry Apprenticeship Trust, 815 15th Street, N.W., Suite 711, Washington, D.C. 20005; Associated General Contractors of America, Inc., 1957 E Street, N.W., Washington, D.C. 20006; and Brick Institute of America, 1750 Old Meadow Road, McLean, Virginia 22101.

Related Occupations

Bricklayers aren't the only construction workers who build structures or surfaces using bricks, stones, concrete, mortar, or cement. Can you identify some of the related occupations described below? If you need help, refer to the list of job titles at the end.

1. I spread, smooth, and finish poured concrete surfaces. Who am I?

2. I cut and shape tiles and apply them to walls, floors, ceilings, and roofs. Who am I?

3. I apply cement, sand, pigment, and marble chips to floors, stairways, and cabinet fixtures to create durable and decorative surfaces. Who am I?

4. I build stone structures such as piers or walls. I also lay walks, curbs, or special types of masonry. Who am I?

5. I carry bricks, concrete, mortar, or plaster to bricklayers, plasterers, or stonemasons. I also mix mortar by hand or with a mixing machine. Who am I?

6. I cut and set slabs of marble in floors and walls of buildings. I also polish and repair slabs that already are in place. Who am I?

Terrazzo worker

Cement mason

Marble setter

Hod carrier or mason tender

Stonemason

Tilesetter

See answers at end of chapter.

Carpenter

Brenda has always liked building things. "In high school, I built the props for plays."

"Hey, get that other clamp over there, will you?" Brenda says. She guides a panel of wood into place as the crane swings it towards her. Steve wedges another panel into place while Pete brings the metal clamp, places it on the form, and tightens it. The column form they are building consists of four wooden panels clamped together at opposite corners. They work in silence for a few minutes, placing the clamps about a foot apart all the way to the top. At last, the form stands secure—a tall, boxlike structure about 16 feet high and 4 feet square.

Brenda and Steve are carpenters. Pete is a carpenter's helper. The work they're doing—building concrete forms—is called "rough carpentry". The forms are molds into which wet concrete can be poured to create the large concrete columns that will support the ceiling of a parking garage. Next year there will be a large office building here, and the parking garage will occupy the first two underground levels. High buildings require a lot of concrete, and wherever there's concrete to be poured, carpenters are on the job—building the forms that provide the shape for the concrete.

Brenda and her co-workers are working outside, in the center of the second level of the parking garage. Since there aren't any columns up yet in the area where they're working, there's no concrete slab above to serve as a roof. Luckily, the sun is out and it's a beautiful spring day.

Brenda feels that being a carpenter helps her stay in good physical condition.

Today Brenda, Steve, and Pete will spend most of the day putting up column forms. Tomorrow, they're likely to be doing something different. The parking garage is in many different stages of construction, most of which require some kind of rough carpentry.

At one end of the parking garage, the second level is just being started. There a crew of carpenters is laying down the plywood decking onto which the wet concrete will be poured to form the second-level slab floor.

At the other end, things are further along. The slab floor for the second level has been laid and columns already are in place. There another crew of carpenters is busy putting up the lumber that will support or brace the plywood decking onto which the concrete slab above will be poured. To do this, the carpenters nail or brace pieces of lumber called jacks, ribs, and stringers to form an overhead frame on which they can nail the sheets of plywood.

"Maybe we'll be working over there by the end of the week," Brenda thinks to herself. She's not looking forward to it. Putting up the ribs and stringers can be dangerous work. To put up the ribs, for example, the carpenters often balance on one rib (a long piece of lumber only 4 inches wide and 4 inches thick) while they're spreading down the one next to it. Just last week one of the carpenters fell backwards off a rib and landed on his back 15 feet below. He's in the hospital now and will be out of work for some time. The carpenters have to be especially careful to avoid that kind of accident.

Brenda will probably spend most of tomorrow stripping column forms. She'll remove the forms from columns in which the concrete has begun to set. That can be a rough job, because the wooden forms stick very tightly to the concrete that has hardened against them, and the carpenters must use a combination of leverage and strength to get them off. Once the carpenters have stripped the forms, they'll coat the insides with form oil to help the forms separate more easily from the hardened concrete next time they're used. When this fluid dries overnight, the forms will be ready to be used again the next day.

As soon as they finish one form, Brenda moves on and begins constructing the next one. You never know when a supervisor's going to be watching you, she figures, and those who don't do their share of the work are most likely to be laid off when things get slow.

"Hey, you don't get tired very easily, do you? Where'd you learn carpentry, anyway? You're good!"

Brenda smiles at the compliment, so different from the treatment she's gotten at other jobs. Why, just a few years ago, people always seemed to be asking why she

Brenda has lunch with her co-workers.

wanted to do "a man's job." Brenda never thought of carpentry as "man's work." It's something she's always been good at and enjoyed doing. Suddenly she realizes that Steve is waiting for an answer.

"Well, I just picked it up, I guess," she begins. "The way you did, probably. I was always building things as a kid. Then, in high school, I got interested in the theater and built the props for plays. The more carpentry work I did, the more I found myself enjoying it.

"That was all there was to it until I found out how much carpenters get paid around here! The chance to make a lot of money convinced me to try to make a career of carpentry. Right after high school I applied for a job with a small construction company that needed carpenters pretty badly. Since then I've gained experience and picked up new skills by working on different kinds of construction jobs.

"Now," she says, changing the subject, "why don't we get this last form built and then move over to the other side?"

There are plenty of people working on the site today. Construction jobs haven't been so easy to come by lately, and so most of these workers feel lucky to be out here working. At least Brenda doesn't have to drive too far to get to work each day. Some of the other carpenters live in another State, and have to commute over 3 hours each way to get to and from work. "When you have to be at work at 7 a.m., that makes for a very long day," she thinks.

Besides the carpenters, the workers on the construction site are mostly cement masons or rodbusters. The rodbusters work with the form carpenters, preparing for the pouring of the concrete. Their job is to install the steel rods that will give added strength to each column. The rodbusters attach the steel rods with wire to other steel rods, called dowels, that are sticking up out of the concrete slab. Once this is done the spot is ready for the carpenters to come and build the form around the rods.

Carpenters have been on the site almost since construction began. When the form work runs out, most of the form carpenters will move on to another site to begin the same type of work on another project. However, Brenda will try to stay on at this site and do some of the other carpentry jobs that will need to be done, installing drywall, for example. In times like these, when construction isn't exactly booming, Brenda knows that to stay employed year-round it helps to be versatile. She's made it a point to learn to handle as many different kinds of carpentry work as possible. During the 5 years she's worked as a carpenter she's learned how to install acoustical tile and drywall, and how to hang doors. These skills, she believes, give her an advantage over some of the other carpenters.

"So, do you think you're going to stay on in construction?" Steve asks as they move over to another column location.

"Sure," Brenda replies quickly. "Maybe someday I'll have a contracting business of my own."

"Great idea," says Steve. "Well, you know what you're doing, that's for sure."

As he walks away, she thinks to herself, "Doing a good job is what counts, after all." Brenda takes pride in doing work of high quality and knows that she's earned the respect of most of her fellow workers. She's looking forward to many more years in carpentry.

Exploring

Carpenters work with their hands. They use both hand and power tools and must handle their tools quickly and skillfully.

- Do you like working with your hands?
- Are you handy with repairs around the house?
- Are you good at working with tools?
- Do you enjoy such activities as building ship or airplane models, building or refinishing furniture, framing pictures, making ceramics, weaving, or doing macrame?
- Are you accustomed to using tools for work around the house or garden, or for repairing bicycles or lawn mowers?
- Have you ever helped put up shelving, install screens or storm windows, replace loose shingles, paint, or fix loose boards or stair railings?
- Do you enjoy learning how to use a tool you've never used before?

Carpenters follow blueprints and diagrams.

- Can you read and understand graphs, diagrams, and charts?
- Can you read road maps?
- Can you look at a drawing and picture the three-dimensional object in your mind?
- Do you understand football or basketball plays when they're written out?
- Can you follow the diagrams in the service booklet for a refrigerator, air-conditioner, or dishwasher?

Carpenters need a working knowledge of mathematics.

- Do you know how to take measurements and calculate fractions, proportions, and percentages?

Carpenters do strenuous outdoor work. The job sometimes involves prolonged standing, climbing, and squatting.

- Are you in good physical condition?
- Do you enjoy outdoor sports and recreational activities, such as football, baseball or softball, track and field, hunting, fishing, climbing, hiking or camping?
- Do you prefer mowing the lawn or working in the garden to working indoors?

Suggested Activities

Build a doghouse or birdhouse. Build a bookcase, table, or other piece of furniture.

Build the props for a school theatrical production.

Volunteer to repair toys at a day care center, Headstart program, or nursery school.

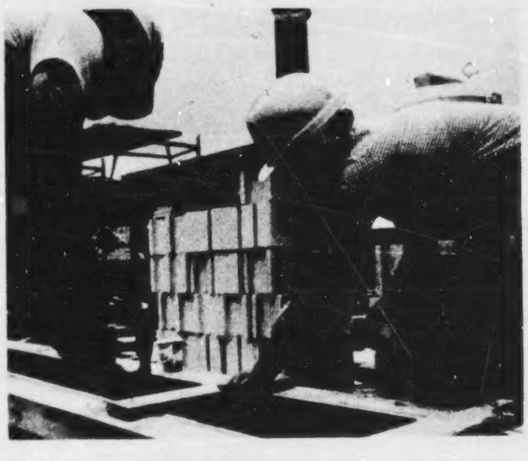
Offer to do minor home repairs or help winterize the homes of elderly neighbors. There may be a program of this kind in your community to which you could volunteer your services. To find out, call the local voluntary action center or agency on aging.

Help renovate a room or building for a teen club or community center.

Invite a carpenter or cabinetmaker to speak to your class about his or her work. Ask the speaker to bring and explain some of his or her tools.

Carpenters need a working knowledge of mathematics. They need to be able to take measurements and do calculations. See if you can do the problems below. They are typical of some of the problems carpenters might deal with.

- A carpenter must use an auger bit to drill a hole exactly $\frac{5}{8}$ of an inch deep. The bit advances $\frac{1}{16}$ of an inch for each turn. How many turns are needed to



"Someday I hope to have a contracting business of my own," says Brenda.

drill the hole?

- A carpenter must place flooring on a concrete slab that is 8 feet by 15 feet. She will be using pine flooring boards that are sold as 1" × 4" × 8'. The carpenter knows, however, that as a result of planing, boards this size are actually ¾" × 3 ¾" × 8'. How many boards will she need for the job?
- An 8-inch-wide rough board is finished by planing ⅞ inch off one side and ¾ inch off the other side. What is the width of the finished board?
- A carpenter is estimating the amount of time required to do a roofing job. He estimates the job will require 20,000 tiles and he knows he can install 1,000 tiles in 1 hour and 45 minutes. How many 8-hour days will be required to complete the job?

See answers at end of chapter.

Invite the instructor of a carpentry course to speak to your class about training opportunities and job prospects in your community. Most school systems have vocational education programs that offer instruction in the building trades. Courses are given in community colleges, technical institutes, and trade schools.

Join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as carpentry, bricklaying, plumbing, and the electrical trades.

Invite a representative of the local carpenters' union to speak to your class about apprenticeship opportunities in your community.

Invite a woman carpenter to speak to your class about her job and how she got started in the field.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops also offer opportunities to test career interests through proficiency badges in a number of areas including Handywoman.

If you are a Boy Scout, try for the Home Repair merit badge.

Eventually, as the United States converts to the metric system, all construction materials will be based on metric sizes. Lumber, concrete blocks, floor and ceiling tiles, bricks, sacks of cement, roofing paper, shingles, doors, and windows will be made in metric sizes and buildings will be designed accordingly. Rules and tapes with metric measures will become familiar.

Use the topic of metrics in woodworking for a report in a mathematics class. You might begin your research by writing for information to the Office of Weights and Measures, National Bureau of Standards, Washington, D.C. 20234. They also will supply a list, by State, of speakers who are willing to talk to groups about the metric system.

Write for career information to the Associated General Contractors of America, Inc., 1957 E Street, N.W., Washington, D.C. 20006 and to the United Brotherhood of Carpenters and Joiners of America, 101 Constitution Avenue, N.W., Washington, D.C. 20001.

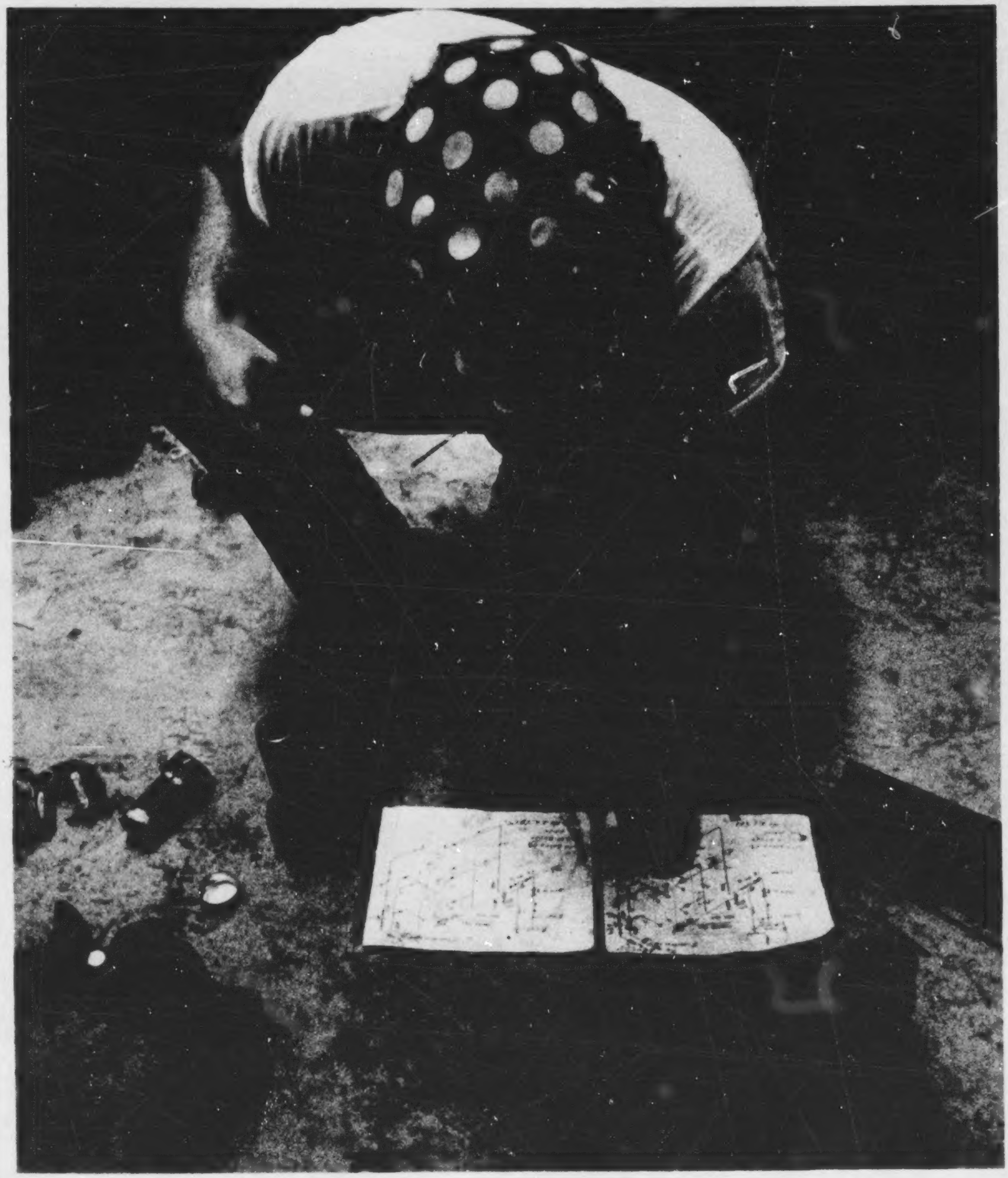
Related Occupations

Carpenters are the largest group of building trades workers, and are employed in almost every type of construction activity. A wide variety of jobs are performed by people with different types of carpentry skills and different job titles. To learn more about some of them, match each occupation in column A with the correct description (in column B) of the objects on which such workers work.

Column A	*Column B*
1. Acoustical carpenter	a. Interior and exterior trim, stairs, hardwood floors
2. Rough carpenter	b. Drywall and other wallboard for ceilings and walls
3. Carpet layer	c. Frames of buildings, general carpentry work in residential construction
4. Cabinetmaker	d. Acoustical tile for walls and ceilings
5. Finish carpenter	e. Concrete forms, scaffolds, temporary frame shelters
6. Framing carpenter	f. Wooden store fixtures, office equipment, cabinets, and high-grade furniture
7. Drywall installer	g. Carpeting installations

See answers at end of chapter.

Plumber



Bob looks over plans for the school's plumbing system.

Construction Occupations

Bob makes his way down the main hall of what soon will be a brand new high school. Painters are on the job now, and Bob has to step carefully around their equipment—ladders, paintbrushes, rollers, cans of paint, and dropcloths.

Bob's in charge of a crew of plumbers. He's been around this site almost since construction began and knows the layout of this building backwards and forwards. Not only does he know the blueprints, he helped design the plumbing system that runs through every part of the building much like the blood vessels in our own bodies. Installing the plumbing for this school was a big job. Bob guided the other plumbers through the entire process, relying on the basic knowledge he gained during his apprenticeship, and the 8 years of experience he's had since then.

The plumbing crew arrived at the site over a year ago, right after the excavation crew left. One of their first jobs was tapping the water and gas mains that lie beneath the city streets. This involved drilling a hole in each of the mains running under Market Street, where the school is located, and installing pipe to run from the main to the school. The plumbers installed underground piping systems for the fresh water that would be brought to the school, as well as for the natural gas that would fuel the school's heating system.

At the same time, the plumbing crew installed the underground clay pipes that carry water waste away from the school. This job involved installing two separate systems of pipes—a sanitary sewer system and a storm sewer system. The school's sanitary sewer system feeds into the city system, which in turn carries waste to the local sewage treatment plant. A separate piping system was installed to handle water runoff. The school's storm sewer system drains water from the athletic fields, from the school parking lot, and from the yard right around the building. Not all of the storm runoff can be thrown together immediately, however. The water from the parking lot, for example, will have oil deposits mixed in it which must be filtered out before this water can be mixed with other runoff and emptied into a lake or river. The plumbers therefore had to lead pipes from the parking lot to a separate chamber where the rainwater runoff could be cleaned up before being channelled into the city's storm sewer system. Installing all that underground pipe took quite some time.

Through the windows that line one side of the hall, Bob sees that it's still gloomy and overcast outside. The weather reminds him of the rainy spring they had while they were putting in those sewer pipes. The plumbers lost more work time than usual because of the heavy rains. And when the rain let up, they found themselves ankle-deep in mud. It wasn't exactly a picnic, working outside in a fine rain, slipping and sliding in the mud. But how quickly a sunny day restored everyone's spirits! On those beautiful days in May, Bob and his crew forgot all their gripes about the weather. In fact, they had had quite a few laughs about all those people with indoor jobs who couldn't enjoy the great weather . . .

After the underground piping systems were installed, the plumbers left the site while the shell of the building was put up. Then the plumbers returned to install pipes inside the walls, ceilings and floors. Although the architect had shown in his floor plans where the fixtures would be placed and how the pipes would run, his diagram actually left much to the plumbers' ingenuity. Using the architect's plans as a guide, Bob and Ted Jones, the plumbing contractor Bob works for, drew up detailed plans for the plumbing system. These plans showed the other plumbers exactly where to lay the pipes, what angles to use at each turn, what size pipes, and what kinds of supports to use.

The plumbers had to design and install several different piping systems for use inside the school. There were the hot and cold water lines that led to the bathroom sinks and to the sinks in the home economics room. Other cold water lines led to sinks in the art rooms and the science laboratories, and to the water fountains in the halls. Cold water lines also led into the fire extinguisher system. In addition, drainage pipes had to be led away from each of the fixtures, and venting pipes had to be installed to allow air into the drain system.

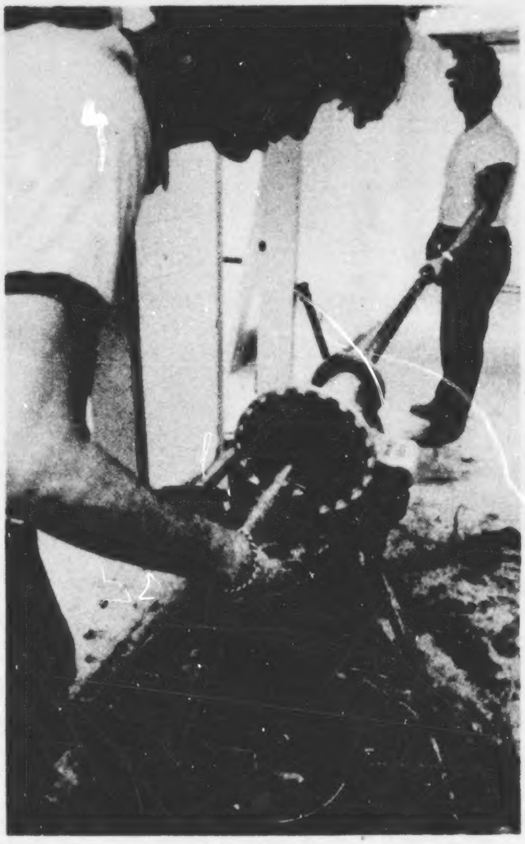
Bob turns a corner in the hall and heads toward the locker rooms at the back of the school to check on the plumbers' progress there. On the way he passes Jack, one of the young plumber apprentices, who is installing metal registers in the hallway. These registers are the last part of the school's heating system to be installed. Earlier, the plumbers had installed the furnace that will burn the gas to heat the air.

"How's it going, Jack?" Bob calls out.

"Just fine," answers Jack, looking up quickly.

Jack's a good worker. He takes his job seriously and never hesitates to ask questions if there's something he's not sure of. Something about Jack's determination to make the most of his apprenticeship reminds Bob of his own start in the trade.

Bob had been accepted in the apprenticeship program right after he graduated from high school. The program lasted 4 years, and during that time Bob was assigned to a variety of projects, from large office buildings to small housing developments. Twice a week he attended classes at night. The combination of classroom instruction and on-the-job training gave him the thorough preparation he needed for becoming skilled and versatile in his trade. After serving his apprenticeship, Bob spent the next 5



Bob helps Jack cut pipe. Jack is learning the trade through a 4-year apprenticeship.

years working at a number of different jobs. As soon as he heard of a construction project nearby, he'd apply for work and stay with the job until the plumbing installation was finished. Then he'd move on to another construction site. Three years ago, Bob decided that he wanted a more permanent job. That's when he started working for Ted Jones, the plumbing contractor. Ted was impressed with Bob's work and his knowledge of the field, so impressed that after less than 2 years he put Bob in charge of the other plumbers in his crew.

This school is the biggest plumbing project Bob's been responsible for so far. Although he was in charge of the plumbing crews on two other projects last year, they were much smaller jobs. However, the solid training he had as an apprentice and his years of experience as a plumber make him sure of himself, even in a job this big. He's been around construction for more than a dozen years, after all—long enough to know what needs to be done, when to do it, and what problems to expect. If he handles jobs like this one as well as he expects to, he may be able to move up to the job of project superintendent before too long. That would mean overseeing an entire construction job and coordinating the work of people in all the building trades, not just the plumbers.

Bob's thoughts are interrupted as he notices Carl walking toward him from the other end of the hall. Carl's a veteran member of his plumbing crew.

"Say, Bob," Carl calls out. "The truck with the sinks and toilets just pulled up, and we're starting to unload. We can start installing the fixtures right away. Do you want us to start with the locker rooms?"

"Right," Bob answers. "I'm going that way right now."

The plumbing crew had put in the piping systems and supports some time ago, before the inside walls were closed up. Heavy fixtures like large sinks and water fountains need plenty of support, so the plumbers had mounted special hangers, screwed into strong supporting braces inside the walls. Now that the walls were finished, there was no sign of any of this plumbing work. Only the fixtures that they were about to install would give evidence of the plumbers' hard work.

Bob makes his way outside now to watch a group of construction laborers unloading some of these fixtures from a large truck.

"Careful, now," he warns as he approaches the truck, where one laborer is pulling at a commode. "That's about 60 pounds of pretty expensive china." The laborer reaches for it more carefully, picks it up and takes it into the school. The plumbers must be strong enough to hold such fixtures in place while bolting them into the wall.

Bob watches while more commodes, some sinks, and some water fountains are unloaded. Things have been running smoothly today, and Bob is feeling good about his job. Bob thrives on his work as a supervisor; he likes organizing the work, supervising the other plumbers, and managing day-to-day problems. And since he likes being on the go all the time, the busy pace is fine with him. He's learning a lot, too. His job gives him a broad view of all the phases of a construction project, and how they fit together. Plumbing is still his favorite construction activity, of course. And in his job as supervisor, Bob has gotten a clearer idea of the variety of tasks that this craft entails. With that thought, Bob turns to go back into the school.

Exploring

Plumbers work with their hands, using handtools such as wrenches, hammers, chisels, and saws. Sometimes they use power tools and gas or acetylene torches.

Carl is the most experienced plumber on Bob's crew.

- Do you enjoy activities that involve working with your hands, such as building ship or airplane models, building or refinishing furniture, framing pictures, making ceramics, doing macrame, or making candles?
- Are you good at working with tools?
- Do you enjoy learning how to use a tool you've never used before?
- Are you handy with repairs around the house?
- Do you help put up shelving, install screens or storm windows, fix loose boards or stair railings, or fix leaky faucets?
- Do you know how to repair a bicycle or lawn mower?
- Do you enjoy working on motorcycle or automobile engines?

Plumbers often have to search for the cause of a problem. They need to know mechanical principles and understand how things work.

- Are you curious about how things work?
- Would you take something apart—your bicycle or an alarm clock, for example—just to see how it's put together?
- Do you try to solve problems in an orderly and logical way?
- Are you persistent? Will you work on a problem until you solve it?

Plumbers follow blueprints and diagrams.

- Can you read and understand graphs, diagrams, and charts?
- Can you read roadmaps?
- Can you look at a drawing and picture the three-dimensional object in your mind?
- Do you understand football or basketball plays when they're written out?

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- Can you follow the diagrams in the service booklet for a refrigerator, air-conditioner, or dishwasher?

Plumbers need a working knowledge of mathematics and science.

- Do you enjoy mathematics and science courses?
- Do you know how to take measurements and calculate fractions, proportions, and percentages?

Each plumbing job is a little different from the rest.

- Do you like variety and change in your daily or weekly schedule?

A plumber's work can be strenuous. It involves a lot of standing, stooping, lifting, and squatting. Much of it is done outdoors.

- Are you in good physical condition?
- Do you like to be active most of the time?
- Do you enjoy outdoor sports and recreational activities, such as football, bicycling, softball, track and field, hunting, fishing, climbing, hiking, or camping?
- Do you prefer mowing the lawn or working in the garden to working indoors?

Suggested Activities

Help with minor plumbing repairs at home. Help your parents replace a washer in a leaky faucet or clean out a sink trap. Your public library has books on home repairs that can guide you.

If there is a home repair or winterization program in your community, volunteer to assist one of the plumbers. To find out if there is such a program where you live, check with your local voluntary action center or agency on aging.

Help family and friends with automobile engine repairs. Do your own repair work for your bicycle. Mechanical work of this kind will give you practice working with small handtools.

Invite a plumber to speak to your class about his or her job. Ask the speaker to bring and explain such tools as wrenches, reamers, drills, braces, and bits.

Invite the instructor of a plumbing course to speak to your class about training opportunities and job prospects in your community. Many school systems have vocational education programs that offer instruction in the building trades. Courses also are given in community colleges, technical institutes, and trade schools.

Join a chapter of VICA (Vocational Industrial Clubs of America), if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as plumbing, carpentry, bricklaying, and the electrical trades.

Invite a representative of the local plumbers' union to speak to your class about apprenticeship opportunities in your community.

If you are a Girl Scout, see if your troop has the From Dreams to Reality program of career exploration. Troops also offer opportunities to test career interests through proficiency badges in a number of areas including Handywoman.

If you are a Boy Scout, try for the Plumbing and Home Repairs merit badges.

Mathematics is an important tool of the trade for plumbers. They must be able to take measurements and do calculations. See if you can do the problems below. They are typical of some of the problems plumbers might deal with.

- The water pressure in a main supplying an irrigation system is 68 pounds per square inch. If the pressure at the nozzles is ⅜ of the main pressure, what is the pressure at the nozzles?
- A plumber cuts the following lengths from a 40-foot piece of pipe: 6 ¾ feet, 4 ⅙ feet, 7 ½ feet, 2 ⅔ feet, 5 5/12 feet. How much pipe is left?
- The weight of a pipe is directly proportional to its length. If a pipe 8 feet 4 inches long weighs 75 pounds, how much does a pipe 6 feet 8 inches long weigh?
- A house drain has a run of 40 feet at a grade of ⅛ inch per foot. The low end has an elevation of 96.25 feet. What elevation is the high end?
- Water weighs nearly 8⅓ pounds per gallon. A gallon equals 231 cubic inches. How many gallons of water are there in a full tank with a volume of 2,079 cubic inches, and how much does this water weigh?

See answers at end of chapter.

Write for career information to the National Association of Plumbing-Heating-Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036.

Related Occupations

Plumbers aren't the only skilled workers who deal with metal piping or duct systems. Which plumbing-related occupations are defined below? Unscramble the letters to find out.

1. RAI NOGITCINODNI, TEGERONARIRIF NDA NTEGIAH HCIEACMN. I install, service, and repair air-conditioning, heating, and refrigeration and cooling systems.

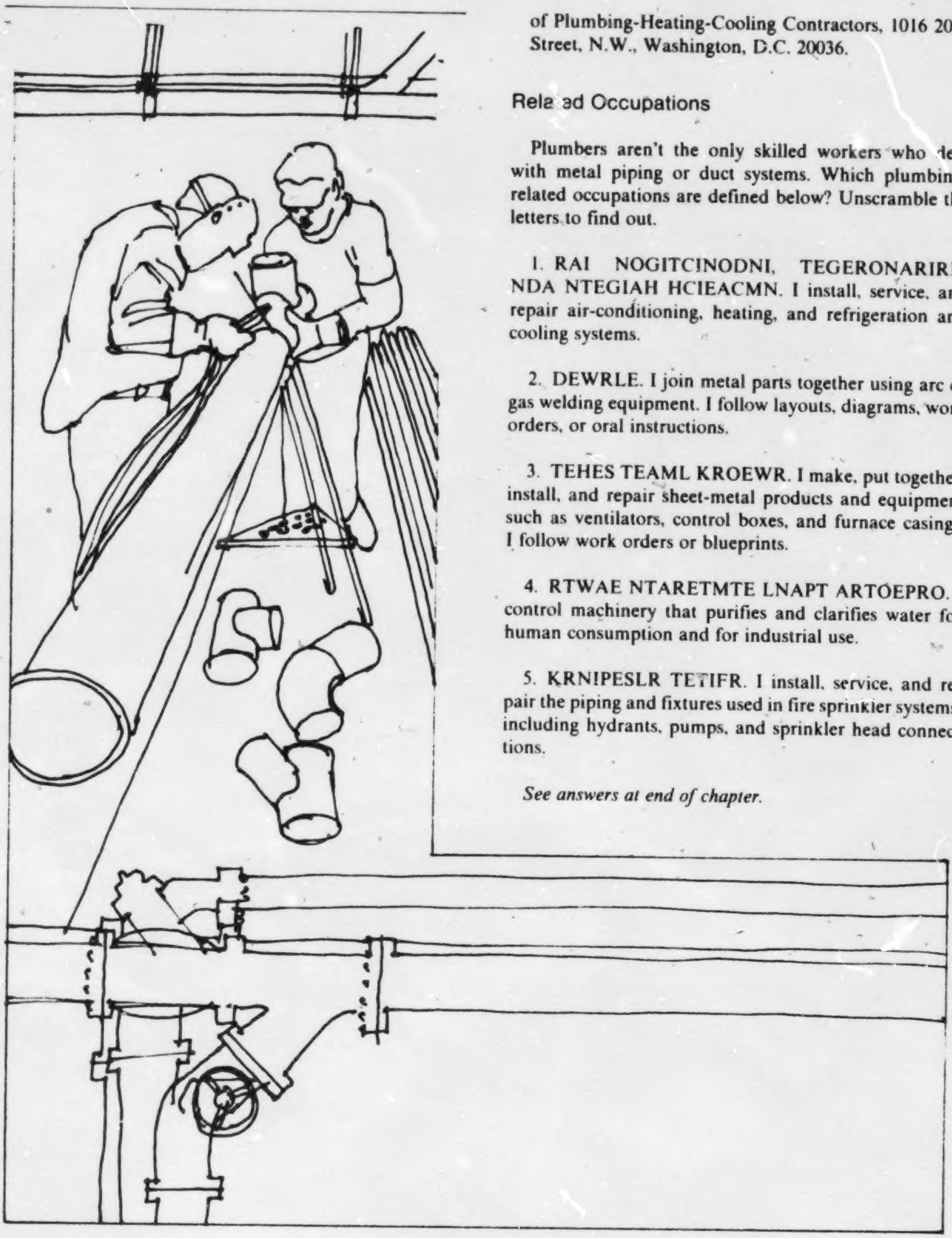
2. DEWRLE. I join metal parts together using arc or gas welding equipment. I follow layouts, diagrams, work orders, or oral instructions.

3. TEHES TEAML KROEWR. I make, put together, install, and repair sheet-metal products and equipment such as ventilators, control boxes, and furnace casings. I follow work orders or blueprints.

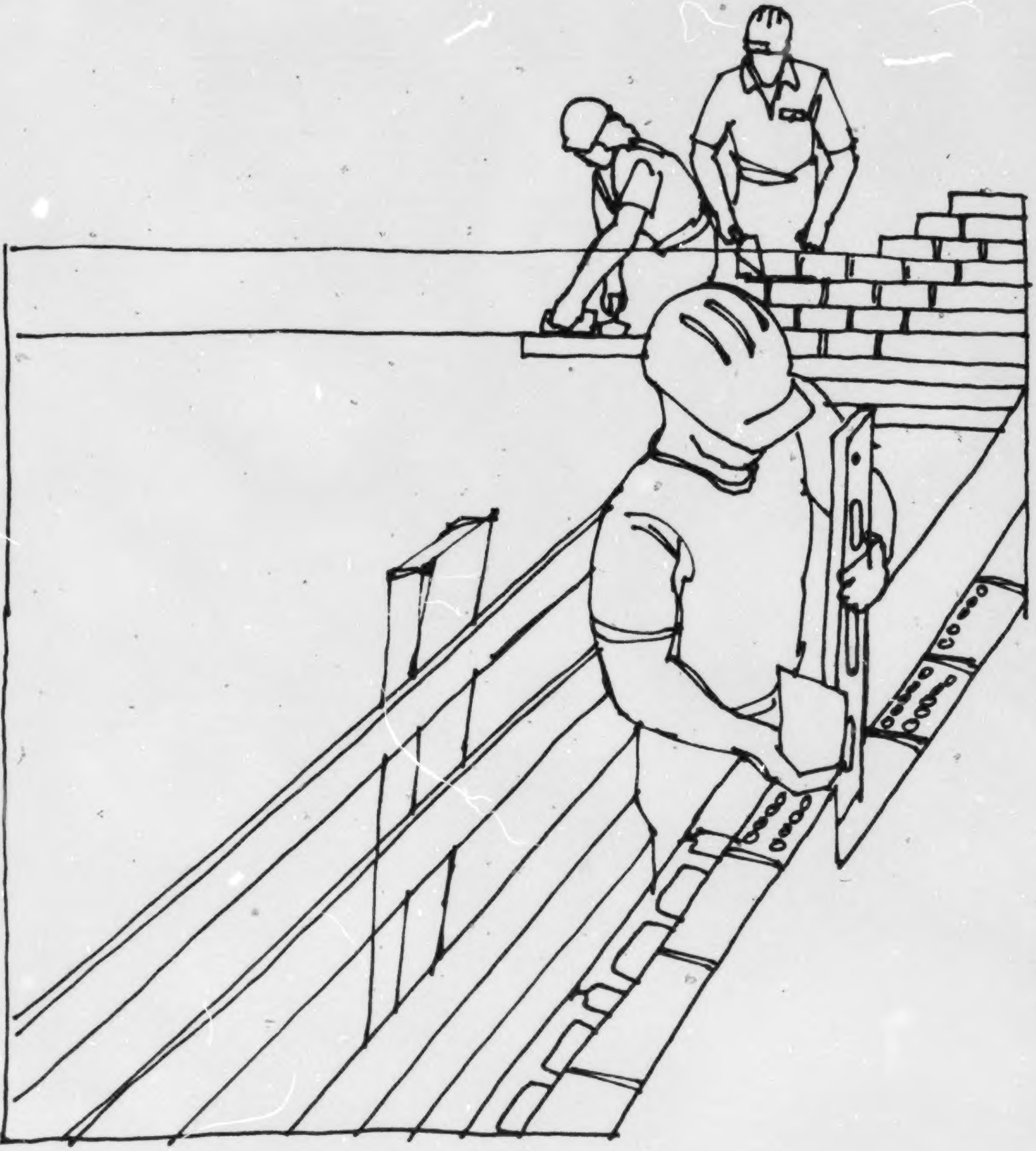
4. RTWAE NTARETMTE LNAPT ARTOEPRO. I control machinery that purifies and clarifies water for human consumption and for industrial use.

5. KRNIPESLR TETIFR. I install, service, and repair the piping and fixtures used in fire sprinkler systems, including hydrants, pumps, and sprinkler head connections.

See answers at end of chapter.



Job Facts



There isn't room in this book for a story about every construction occupation. However, you'll find some important facts about 19 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Construction Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Bricklayers, Stonemasons, and Marble Setters	Workers in these crafts build and repair structures such as walls, fireplaces, patios, and walkways using brick, tile, terra cotta, marble, and other materials. Most work for building contractors. Bricklayers work throughout the country, but most stonemasons and marble setters work in metropolitan areas. In cities that are too small to have a demand for full-time masons or setters, bricklayers may install stone or marble as a sideline. Many bricklayers are self-employed and specialize in contracting on small jobs such as patios and fireplaces. Bricklayers work on all kinds of buildings, but because stone and marble are expensive, stonemasons and marble setters work mostly on high cost buildings such as offices, hotels, and churches.	Most bricklayers, stonemasons, and marble setters learn their skills informally by working as helpers or hod carriers. They start with carrying materials, moving scaffolds, and mixing mortar. It takes several months to a year before they are taught to spread mortar and lay brick. Other workers in these crafts learn their skills through apprenticeship, which involves 3 years of on-the-job training plus classroom instruction in such subjects as blueprint reading, mathematics, and sketching. A high school education is important for entry into an apprenticeship program. Manual dexterity is important, because these workers use handtools such as trowels, brick and stone hammers, wood or rubber mallets, and chisels. For exacting cuts of brick, stone, or marble, they use electric saws with special cutting blades. The work can be strenuous because it involves lifting and prolonged stooping and standing. Most of the work is performed outdoors.	Many bricklayers, stone masons, and marble setters are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Carpenters	Carpenters construct, remodel, and repair wooden structures. They are the most numerous of all building trades workers, and work in almost every kind of construction activity. The work is commonly divided into two categories: "rough" and "finish" carpentry. Rough carpentry involves erecting the wooden framework of a building, making forms for concrete, and putting up scaffolds. Finish carpenters install molding, wood paneling, cabinets, window sash, and so forth. Skilled carpenters can do both kinds of work. Most carpenters work for contractors, but many are self-employed. Some carpenters alternate between working for contractors and doing small jobs on their own. Some carpenters do construction work in factories, government installations, mines, shipyards, and large buildings.	An apprenticeship program is recommended as the best way to learn carpentry. Apprenticeship usually consists of 4 years of on-the-job training plus classroom instruction in drafting and blueprint reading, mathematics, and the use of woodworking machines. Training may also be acquired on the job. A high school education or its equivalent is desirable. Some knowledge of the trade may be obtained through vocational school courses in carpentry and shop. Manual dexterity is important because carpenters use handtools such as hammers, saws, chisels, and planes and power tools such as portable power saws, drills, and rivet guns. Good physical condition, a good sense of balance, and a lack of fear of working at heights also are important attributes for carpenters.	Carpenters have greater opportunities than most other construction workers to become supervisors since they are involved in the entire construction process. Some become contractors and run their own businesses. Many carpenters are union members.
Cement Masons and Terrazzo Workers	Cement masons mix, pour, and finish concrete for projects ranging in size from small patios to large office buildings to huge dams. Terrazzo workers apply a mixture of concrete and marble chips to surfaces to create attractive floors and walkways. Most masons specialize in small jobs, such as driveways, sidewalks, and patios; most terrazzo workers specialize in floors. Cement masons work for general contractors who construct entire projects, and for contractors who only do concrete work. Most terrazzo workers work for special trade contractors who install decorative floors and wall panels.	Cement masons and terrazzo workers learn their trade either through on-the-job training as helpers or through 2- or 3-year apprenticeships. On the job, helpers begin with simple tasks, but usually are doing finishing work within a year. In the apprenticeship program, apprentices learn applied mathematics, blueprint reading, and safety. Three-year apprentices receive special instruction in layout work and estimating. Masonry or terrazzo work is active and strenuous, and requires much stooping, bending, and kneeling. Cement masons and terrazzo workers therefore need physical strength and stamina.	Cement masons often work overtime, because once the concrete has been poured the job must be completed. They generally receive premium pay for overtime work. Many cement masons and terrazzo workers are union members.

Construction Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Construction Laborers	Laborers under the direction of other trade workers provide much of the routine physical labor on construction and demolition projects. They erect and dismantle scaffolding and clean up rubble and debris. Laborers also help unload and deliver materials, machinery, and equipment to other construction workers. Construction laborers work on all types of construction projects. They work for construction contractors, for State and city public works and highway departments, and for public utility companies.	Little formal training is required for work as a construction laborer. Generally, applicants must be at least 18 years old and in good physical condition.	Construction laborers are usually the first workers to arrive on a construction project—assisting in site preparation—and the last to leave. After several years of experience and training, many laborers advance to craft jobs, such as carpenter, bricklayer, or cement mason. Some construction laborers are union members.
Drywall Installers and Finishers	Drywall installers create inside walls by fastening drywall panels to the framework inside houses and other buildings. Finishers do touchup work to get the panels in shape for painting. Most drywall installers and finishers work for contractors that specialize in drywall construction; others work for contractors that do all kinds of construction. In many small towns, carpenters install drywall and painters finish it.	Drywall installers and finishers usually start as helpers and learn most of their skills on the job. Some employers, in cooperation with unions, offer classroom instruction to supplement on-the-job training. Apprenticeship programs last about 2 years. Drywall installers must have the stamina to spend most of the day on their feet, standing, bending, stooping, or squatting. They must be able to lift and maneuver heavy panels.	Some drywall installers and finishers are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Electricians	Construction electricians install electrical systems that operate heating, lighting, power, air-conditioning, and refrigeration components. These workers also install electrical machinery, electronic equipment and controls, and signal and communications systems. Most construction electricians work for electrical contractors. Many others are self-employed contractors.	Most training authorities recommend the completion of a 4-year apprenticeship program as the best way to learn the electrical trade. However, some people learn the trade informally by working for many years as electricians' helpers. Many helpers gain additional knowledge through trade school or correspondence courses, or through special training in the Armed Forces. Electricians must be able to work in cramped places and in awkward positions, to stand for long periods of time, and to climb ladders and balance themselves while working. Finger dexterity is important for working rapidly and accurately with small handtools such as pliers, screwdrivers, and knives. Normal color vision is important because workers frequently must identify wires by color. A license is necessary for employment as an electrician in some cities.	The seasonal nature of construction work affects electricians less than workers in most building trades, because so much of their work is indoors. Many electricians are union members.
Elevator Constructors	Elevator constructors assemble and install elevators, escalators, and similar equipment. After it is in service, they maintain and repair it. Most elevator constructors are employed by elevator manufacturers. Others are employed by small, local contractors who specialize in elevator maintenance and repair. Still others work for government agencies or business establishments that do their own elevator maintenance and repair.	Almost all elevator constructors learn their job primarily through on-the-job training supplemented by classroom instruction. A trainee usually can become a fully qualified constructor within 4 years. A high school education is required. Some States and cities require elevator constructors to pass a licensing examination. To install and repair modern elevators, elevator constructors must have a working knowledge of electricity, electronics, and hydraulics. They also must be able to repair electric motors, control systems, and signal systems. Because of the variety of their work, they use many different handtools, power tools, and testing meters and gauges. The ability to work at great heights without fear is important.	Unlike most other construction trades people, elevator constructors usually work year round. When construction of new buildings declines, the construction of new elevators and escalators does also, but the demand for the repair and maintenance of older elevators and escalators remains constant. Most elevator constructors are union members.

Construction Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Floor Covering Installers	Floor covering installers install and replace carpet or resilient floor covering materials such as tile, linoleum, and vinyl sheets. Most installers work for flooring contractors. Many others work for retailers of floor covering and home alteration and repair contractors. About four-fifths work primarily with carpet, and the remainder with resilient flooring. About 1 out of 4 floor covering installers is self-employed, a higher proportion than the average for all building trades. Installers are employed throughout the Nation, but most are concentrated in urban areas that have high levels of construction activity.	The vast majority of floor covering installers learn their trade informally on the job by working as helpers to experienced installers. Most others learn through formal apprenticeship programs, which include on-the-job training as well as related classroom instruction. Courses in general mathematics and shop may provide a helpful background for floor covering work. High school graduates are preferred. Floor covering installers must be able to stand, bend, and kneel for long periods of time, to work in awkward positions, and to work rapidly and accurately with small handtools.	Floor covering installers generally specialize in either carpet or resilient floor covering installation, although some do both types. Many floor covering installers are union members.
Glaziers	Construction glaziers cut and install all types of building glass, including windows, glass doors, and mirrors, and also install steel sash. Most glaziers work for glazing contractors in new construction, alteration, and repair. Others work for government agencies or businesses that do their own construction work. Glaziers work throughout the country, but jobs are concentrated in metropolitan areas. Glaziers occasionally may travel to work for a day or two in small outlying towns where few people, if any, are equipped and qualified to install glass in commercial buildings such as stores.	Most glaziers learn their trade through a 4-year apprenticeship program. Others learn the trade informally on the job by assisting experienced workers. Learning the trade through on-the-job experience can take considerably longer than through apprenticeship. A high school diploma is generally desired for helpers, and is required for apprenticeship applicants. Courses in general mathematics, blueprint reading or mechanical drawing, general construction, and shop provide a helpful background. Glaziers need manual dexterity and the physical ability to carry plates of glass and climb, reach, and stretch while installing the glass.	Many glaziers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Insulation Workers	Insulation workers cover surfaces such as walls, ducts, pipes, and tanks with insulation materials that prevent excessive loss of cool or hot air. Most insulation workers work for insulation contractors. Others are employed to alter and maintain insulated pipework in chemical factories, petroleum refineries, power plants, and similar structures which have extensive steam installations for power, heating, and cooling. Some large firms which have cold-storage facilities also employ these workers for maintenance and repair.	Almost all insulation workers learn their trade through either informal on-the-job training or a formal 4-year "improvership" program similar to apprenticeship. A high school diploma is preferred for entry level jobs, and is required for improvership positions. High school courses in blueprint reading, shop math, and general construction provide a helpful background. Insulation workers must have the physical stamina to spend most of the day on their feet, standing, bending, stooping, or squatting. They should not be afraid to work on ladders or in tight spaces.	Many insulation workers are union members.
Ironworkers	Ironworkers put up the steel framework and other metal parts of buildings, bridges, and other structures. They also deliver heavy machinery to new sites. Most ironworkers work for general contractors, steel erection contractors, or ornamental iron contractors. Many work for large steel companies or their subsidiaries engaged in the construction of bridges, dams, and large buildings. Some work for government agencies, public utilities, or large industrial firms that do their own construction work.	Most training authorities recommend the completion of an apprenticeship as the best way to learn these trades. Some people, however, learn the trades informally by working as helpers to experienced ironworkers. Applicants for the 3-year apprenticeship program generally must have a high school education. Courses in general mathematics and mechanical drawing provide a helpful background. Since materials used in ironworking trades are heavy and bulky, above-average physical strength is necessary. Agility and a good sense of balance also are required in order to work at great heights and on narrow footings.	Ironworkers comprise four related trades—structural ironworkers, riggers and machine movers, ornamental ironworkers, and reinforcing ironworkers. Many ironworkers are skilled in two of these trades or more. Ironwork can involve considerable travel because demand in an area may be insufficient to keep local crews continually employed. Many ironworkers are union members.

Construction Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Lathers	Lathers install lath—the base for wet cement—plaster, or stucco on walls and ceilings. Most lathers work for lathing and plastering contractors on new residential, commercial, or industrial construction. They also work on modernization and alteration jobs. A relatively small number of lathers are employed outside the construction industry; for example, some make the lath backing for plaster display materials or scenery.	Although many lathers acquire their skills on the job, apprenticeship is recommended. Apprenticeship programs usually last a minimum of 2 years, and include classroom instruction in applied mathematics, blueprint reading, sketching, estimating, basic welding, and safety. Apprenticeship applicants usually are required to have a high school education or its equivalent. Courses in general mathematics and mechanical drawing can provide a helpful background. Lathers need manual dexterity and mechanical ability. Although a lather's work is not strenuous, it does require standing, squatting, or working overhead for long periods.	Many lathers are union members.
Operating Engineers	Operating engineers run the power construction equipment used to excavate and grade earth, erect structural and reinforcing steel, and pour concrete. Workers are often identified by the type of machine they operate. For example, they may be known as crane operators, bulldozer operators, or derrick operators. Most operating engineers work for contractors in highway, dam, airport, and other large-scale construction projects. Others work for utility companies, manufacturers, and other business firms that do their own construction work, as well as State and local highway and public works departments. Some work in factories and mines to operate cranes, hoists, and other power-driven machinery.	Most training authorities recommend completion of a 3-year apprenticeship as the best way to become an operating engineer. Apprentices learn to operate a variety of machines, and receive classroom instruction in engine operation and repair, cable splicing, hydraulics, welding, and safety and first aid. Less extensive training is available through special heavy-equipment training schools. Courses in driver education and automobile mechanics provide a helpful background. Experience in operating tractors and other farm machinery also is helpful. Operating engineers need stamina to withstand high noise levels and constant shakes and jolts from the machines.	The range of skills for operating engineers may vary widely because they work with many different types of machines. Heavy machines (like large cranes) are usually complex and difficult to operate; medium-sized equipment (like bulldozers) generally requires less skill, and lightweight equipment (such as air compressors) is the easiest to operate. Some operating engineers know how to operate several kinds of machines. Many operating engineers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Painters and Paperhangers	Painters apply coats of paint, varnish, stain, enamel, or lacquer to decorate and protect building surfaces. Paperhangers cover walls and ceilings of rooms with decorative wallpaper, fabrics, vinyl, or similar materials. Many painters and paperhangers work for contractors who do new construction, repair, alteration, or modernization work. Many organizations that own or manage extensive property holdings also employ maintenance painters. A high proportion of workers in these trades are in business for themselves.	Most training authorities recommend the completion of a formal apprenticeship as the best way to become a painter or paperhanger. However, because apprenticeship programs are limited, many new workers begin as helpers to experienced painters. Generally, painters only paint. Paperhangers, however, both paint and hang wallpaper. As a result, paperhangers require more training and additional skills, and a larger percentage of paperhangers than painters are trained through apprenticeship. A high school education is preferred for both occupations. Painters and paperhangers must have stamina, because their jobs require a considerable amount of climbing and bending, as well as standing for long periods. Painters in particular should not be afraid of heights. A painter also must have strong arms, because much of the work is done with arms raised overhead. Manual dexterity and good color sense are important.	Many painters and paperhangers are union members.
Plasterers	Plasterers apply coats of plaster to finish interior walls and ceilings. They apply durable cement plaster or stucco to exterior surfaces. Plasterers work mostly on new construction and alteration work, particularly where special architectural and lighting effects are part of the job. Some plasterers repair older buildings.	Most training authorities recommend completion of a 3- or 4-year apprenticeship as the best way to learn plastering. However, many people learn the trade by working as helpers or laborers, observing and being taught by experienced plasterers. Courses in general mathematics, mechanical drawing, and shop provide a useful background. Manual dexterity is important. Strength and stamina are also necessary, because plastering requires considerable standing, stooping, and lifting.	Many plasterers are union members.

Construction Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Plumbers and Pipefitters	Plumbers and pipefitters assemble, install, and repair pipe systems that carry water, steam, air, or other liquids and gases. They also install plumbing fixtures, appliances, and heating and refrigeration units. Most plumbers and pipefitters work for plumbing and pipefitting contractors engaged in new construction activity, and work mainly at the construction site. Many plumbers are self-employed or work for plumbing contractors doing repair, alteration, or modernization work. Some plumbers install and maintain pipe systems for government agencies and public utilities, and some work on the construction of ships and aircraft. Others do maintenance work in industrial and commercial buildings. Pipefitters, in particular, are employed as maintenance personnel in the petroleum, chemical, and food-processing industries where manufacturing operations include the processing of liquids and gases through pipes.	A 4-year apprenticeship including related classroom instruction is recommended as the best way to learn all aspects of the plumbing or pipefitting trade. However, many people learn plumbing or pipefitting by working for several years as helpers to experienced plumbers or pipefitters. A high school or vocational school education is recommended. Courses in chemistry, general mathematics, mechanical drawing, physics, and shop are helpful. Some localities require workers to pass a licensing examination. Manual dexterity and mechanical ability are important. Plumbers must also be able to stand for long periods and occasionally must work in cramped or uncomfortable positions.	Many plumbers and pipefitters and union members.
Roofers	Roofers install and repair roofing using such materials as sheet metal, tile, slate, asphalt shingles, composition, felt, tar, and gravel. They may also waterproof walls and floors. Most roofers work for roofing contractors on construction or repair jobs. Some work for businesses and government agencies that do their own construction and repair work. A few roofers are self-employed.	A 3-year apprenticeship including related classroom instruction is recommended. Most roofers, however, acquire their skills informally by working as helpers for experienced roofers. A high school education is helpful for people interested in becoming roofers. Courses in mechanical drawing and basic mathematics are especially helpful. Good physical condition, a good sense of balance, and an ability to work at heights without fear are important assets.	Roofers have to be outdoors in all kinds of weather, and the work can be very hot in the summer months. Many roofers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Sheet-Metal Workers	Sheet-metal workers make and install sheet-metal ducts for air-conditioning, heating, and ventilating systems; flat metal for kitchen walls and counters; and stamped metal for roofing and siding. Some workers specialize in onsite installation. Some work primarily in shops doing fabricating and layout work. Others do both. Sheet-metal workers in the construction industry are employed mainly by contractors who specialize in heating, refrigeration, and air-conditioning equipment, and by general contractors engaged in residential, industrial, and commercial building. Additional sheet-metal workers are employed by government agencies or businesses that do their own construction and alteration work. Very few are self-employed.	A 4-year apprenticeship program is recommended, and most sheet-metal workers learn their skills this way. Many others, however, have acquired their skills by working as helpers to experienced workers. A high school education is required for entry to apprenticeship programs, and courses in mathematics, mechanical drawing, and shop provide a helpful background. Sheet-metal workers need to be able to work high above the ground at times. At other times, they must be able to work in cramped and awkward positions. Good physical condition is important.	Many sheet-metal workers are union members.
Tilesetters	Tilesetters apply tile to floors, walls, and ceilings. Tilesetters are employed mainly in nonresidential construction projects, such as schools, hospitals, and public and commercial buildings. A significant proportion of tilesetters—about 1 out of 5—is self-employed.	A 3-year apprenticeship program is recommended as the best way to learn tilesetting. Many tilesetters, however, acquire their skills informally by working as helpers to experienced workers. When hiring apprentices or helpers, employers usually prefer high school or vocational school graduates who have had courses in general mathematics, mechanical drawing, and shop. Good physical condition, manual dexterity, and a good sense of color harmony are important assets.	Since tilesetters work mostly indoors, the annual number of hours they work generally is higher than some of the other construction crafts. Many tilesetters are union members.

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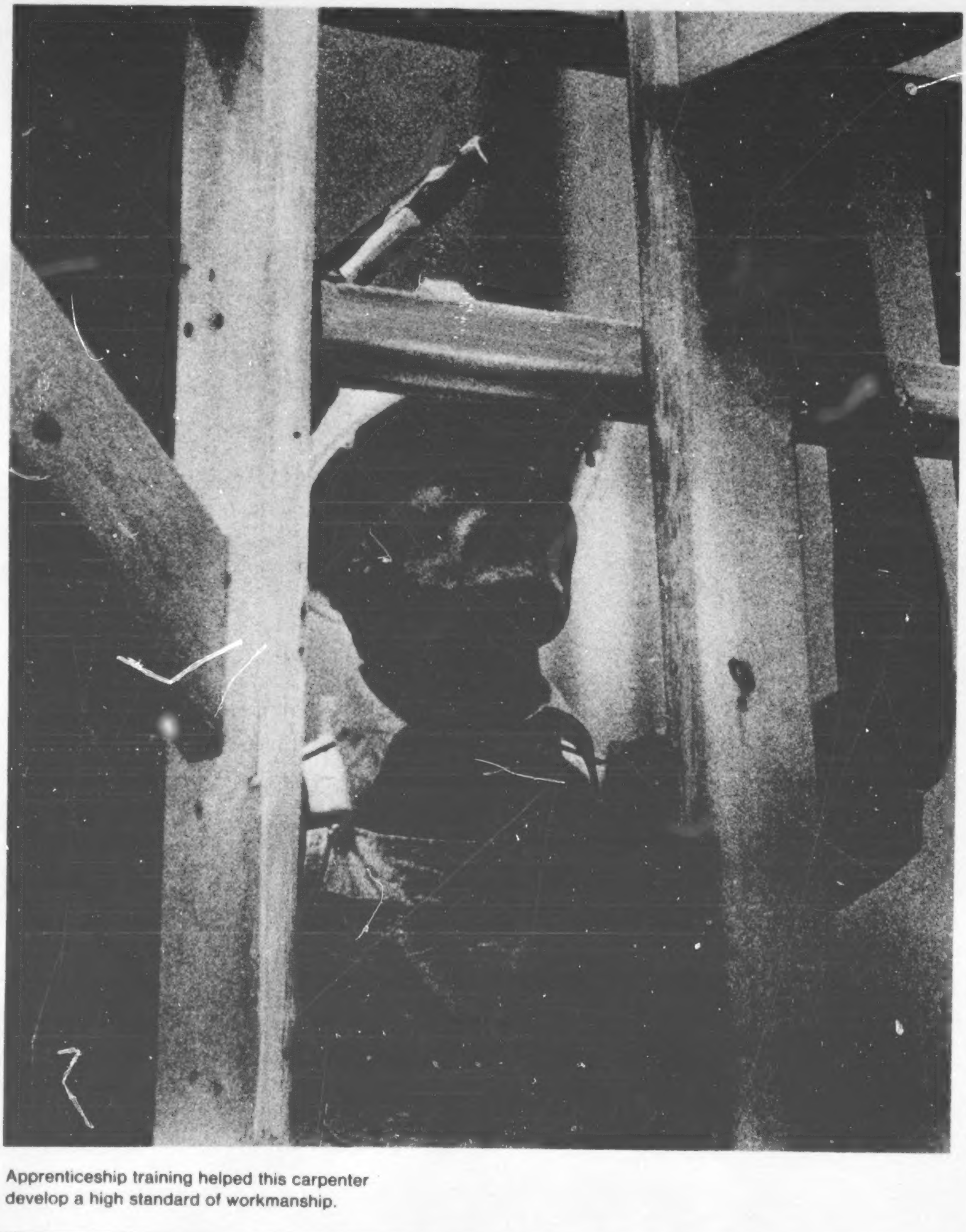


Apprenticeship training helped this carpenter develop a high standard of workmanship.

Exploring Careers

Answers to Related Occupations

BRICKLAYER

1. Cement mason, 2. Tilesetter, 3. Terrazzo worker, 4. Stonemason, 5. Hod carrier or mason tender, 6. Marble setter.

CARPENTER

1. d, 2. e, 3. g, 4. f, 5. a, 6. c, 7. b.

PLUMBER

1. Air-conditioning, refrigeration, and heating mechanic, 2. Welder, 3. Sheet-metal worker, 4. Water treatment plant operator, 5. Sprinkler fitter.

Answers to math problems

BRICKLAYER

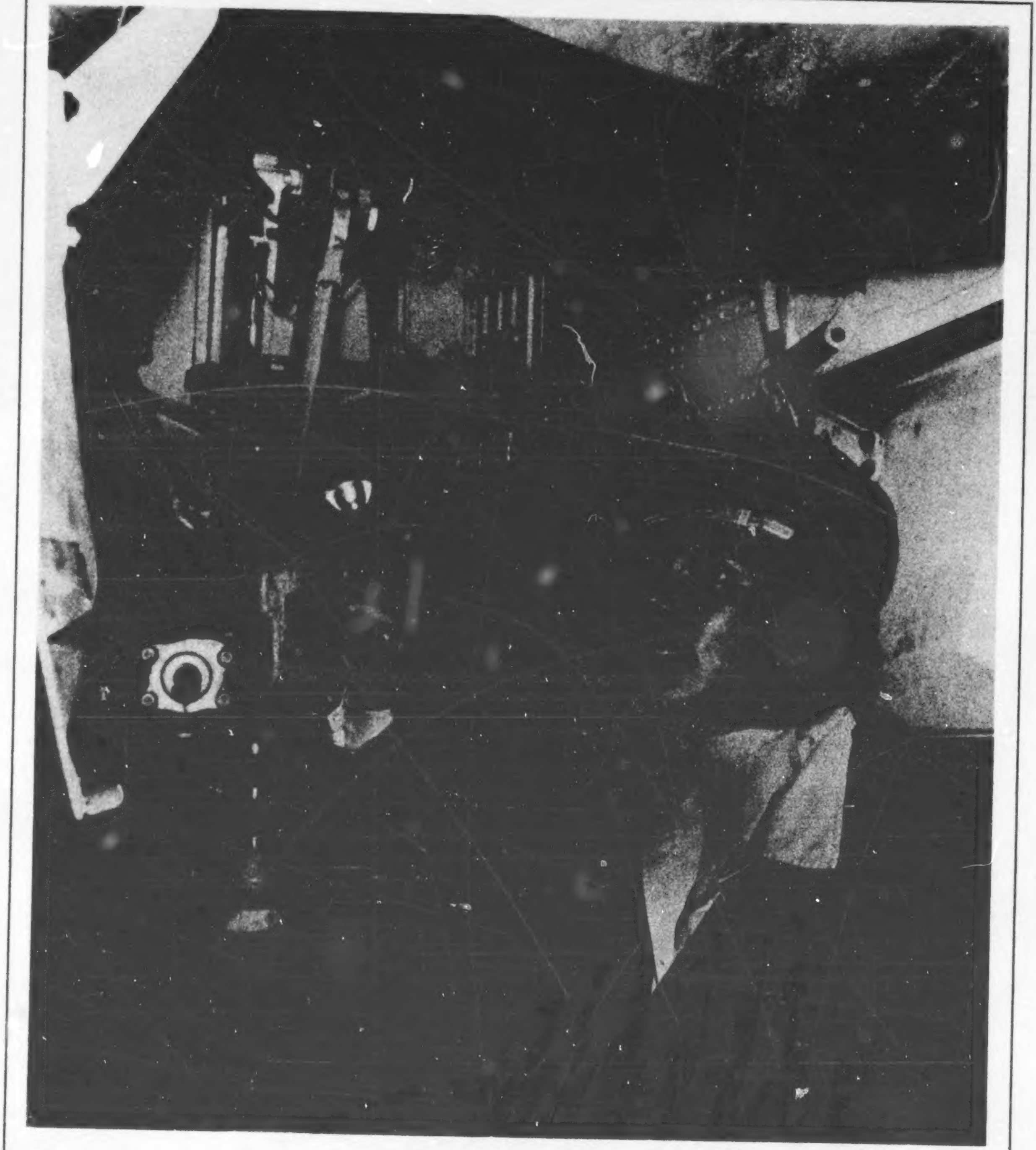
212 inches or 17⅔ feet, 12 hours or 1½ days, 3,080 bricks, 8.75 cubic yards.

CARPENTER

10 turns, 48 boards, 6⅜ inches, 35 hours = 4⅜ 8-hour days.

PLUMBER

25.5 pounds per square inch, 13.5 feet, 60 pounds, 96⅔ feet, 9 gallons weighing 75 pounds.



This flight engineer is checking out her jet before takeoff.

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Exploring Careers

Earnings of airline pilots are among the highest in the Nation.

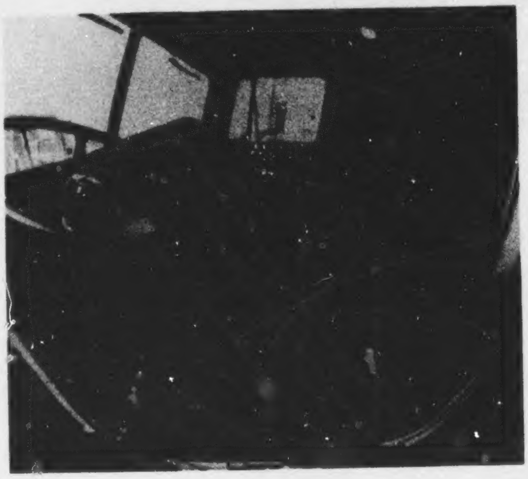
Coming from the West

The Midwestern plane began a smooth descent as it neared Lambert Field, the St. Louis international airport. Walter Faraday, the pilot on Flight 682, was carrying a full plane of 300 people from Denver. He was surrounded by an assortment of electronic and mechanical buttons and gauges, all of which required special attention. The cockpit was equipped with communications equipment that allowed contact with air traffic controllers along the way. Other instruments showed the plane's speed and position, the amount of fuel, and the condition of the engine. Working alongside him in the cockpit were the co-pilot and the flight engineer, who helped maneuver the plane for a safe flight.

"I was afraid those strong headwinds we ran into over Topeka would really put us behind schedule," he said to Raul Morales, his co-pilot. "But going up to 25,000 feet helped us pick up the speed we needed. We're only 15 minutes behind schedule." As he spoke, his left hand pulled the throttle, slowly decreasing the speed of the plane.

"Yes, looks like we did a fine job," Raul replied. He was busy checking other instruments.

"This is Midwestern 682 to St. Louis tower," Walter said into the microphone. "Request final approach instructions."



Well-designed cabs reduce the strain of truckdriving.

Coming from the East

Not quite 200 miles east of the St. Louis airport, on Highway 40, a large grey truck was cruising at a comfortable speed. Seated behind the wheel, Louise Windsor rubbed her tired eyes and glanced down at her watch. "Making pretty good time," she thought. "We should be in St. Louis by dinnertime."

Louise and Frank (her husband and driving partner) had been on the road for 3 full days, with only a few hours' sleep along the way. Arriving in St. Louis meant the end of the line, where they would drop off the load of furniture they were carrying and spend a comfortable night before heading back home to North Carolina.

Her eyes were fixed on the crowded interstate as mile after mile passed. Located high in the cab of the 18-wheeler, it was easy for Louise to watch the road and plan her route to minimize delays. After all, the longer it took to deliver each load, the more time and money it cost.

Louise chatted on the CB radio to find out about weather and road conditions up ahead and to pass the time. Occasionally, she looked down at the instrument panel in front of her to check her speed, fuel, oil pressure, and the temperature of the engine. "We'd better stop for fuel," she said.

"Let's stop at the next exit," Frank replied. "I could use a cup of coffee anyway."

Louise eased onto the exit ramp, downshifting the truck through many gears. She braked to a stop next to the diesel fuel pump and said to the attendant, "Fill it up, please."

Transportation Occupations

Coming from the South

Some 300 miles south of St. Louis, a broad-beamed tugboat was pushing a string of barges carrying fuel oil from the Gulf Coast.

"Head about 10 degrees northeast," Bud Hennison directed his second mate, Rick Proctor. "The radar equipment picks up a barge 8 miles to the north," he added.

The two merchant marine officers stood at the controls of the tugboat *Olympia*. They had been on the river for days and were now on the last leg of their voyage up the Mississippi River to St. Louis. As chief mate and head officer of the deck crew, Bud's job was to navigate the ship. This meant plotting and maintaining the vessel's course. At the moment, they were in a heavy fog that made it impossible to see other river traffic.

"Give a short blast on the whistle," Bud ordered.

As the *Olympia's* whistle sounded through the fog, Bud took the clipboard from its place next to the radar and sonar equipment and began writing. Being responsible for the safe, smooth operation of the ship involved recording or "logging in" all the events of the voyage. Just then there was a distant whistle from the starboard side.

"Looks like they received our signal," said Bud. "Keep an eye out for them. I'm going down to the deck."

You have just spent a few moments with an airplane pilot, a long-distance truckdriver, and the chief mate on a cargo carrier. Let's see if these people have anything in common other than being bound for St. Louis.

All of them work in the transportation industry. Transportation is the business of moving people and goods from one place to another. It includes travel by air, rail, water, on roads and highways, even underground. Someday it may include travel in space.

This man is training to become a riverboat pilot.

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Exploring Careers

The Nation's 200,000 miles of railroad track are an important means of moving people, food and industrial goods.

We all depend on the transportation industry. For example, you may take a bus to get to school each morning. Your parents may travel to work by car, bus, train, or subway. Even if you walk or ride your bicycle most of the places you need to go, the transportation industry serves you in other ways.

It is the means through which energy, raw materials, and finished products are channeled where they are needed. Railroads and trucks carry the food, lumber, automobiles, furniture, clothing, and thousands of other goods that fill our stores. Ships and airplanes carry goods between cities in America and throughout the world. The food we eat may come from farms hundreds or even thousands of miles away. All this is possible because railroad trains, trucks, and planes are constantly on the move. The transportation industry links Americans with each other and with the rest of the world.

Transportation Occupations

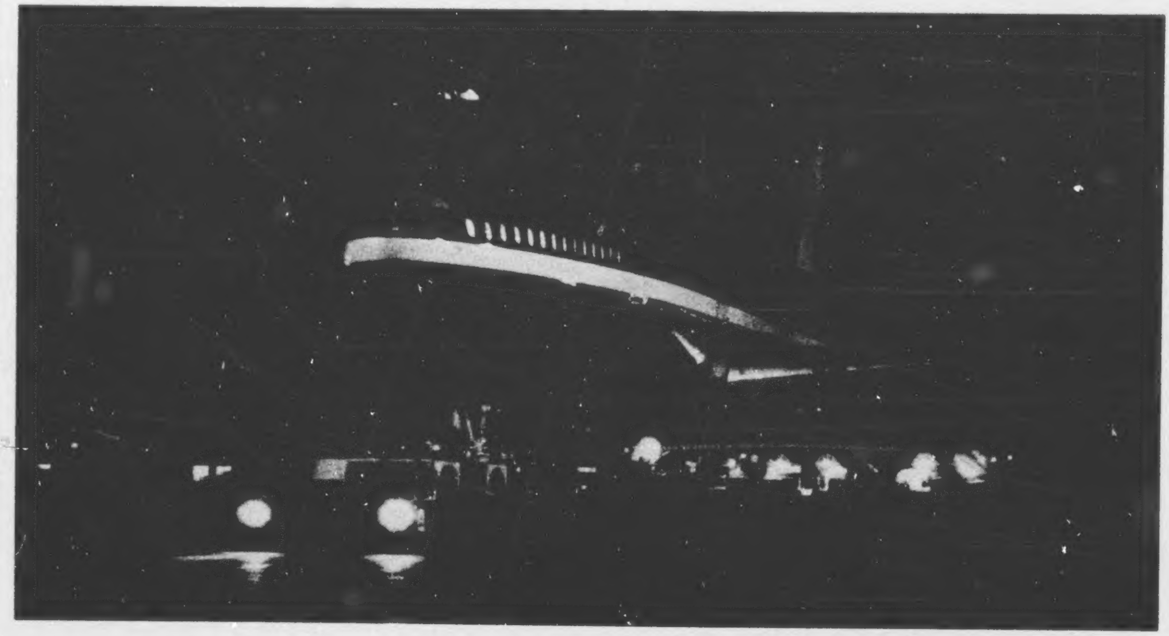
The people we usually think of as "transportation workers" are those who operate the vehicles—pilots and busdrivers, for example. However, people with many different skills are needed to keep America on the move. Mechanics and technicians keep the vehicles and equipment in top working condition. Railroad yard clerks and taxicab dispatchers are transportation workers who perform clerical and administrative tasks. Still other transportation workers deal with the public. They may seek new customers, make reservations, help children or handicapped travelers, or take care of complaints.

We can begin to explore transportation careers by looking at each of four groups of transportation occupations: Air transportation, merchant marine, railroad, and driving.

Transportation Occupations

Air transportation occupations. The *pilot* and *flight attendant* may be the first people who come to mind when you think about flying, but many other workers are needed to ensure a safe flight. Helping the captain, or pilot, guide the plane is the *co-pilot*. The co-pilot is the second in command on any flight. Also aboard is the *flight engineer*, who monitors the engine, fuel, and all other systems. Just as important are those who provide airplane services on the ground. These include the *air traffic controllers* who monitor the path of the airplane from start to finish. Generally, the pilot does not make any move without first "okaying" it with the controllers. *Aircraft mechanics* keep airplanes running safely and well. Besides repair work they do maintenance regularly. Many different people are employed to book customers and coordinate flights. *Reservation, ticket, and passenger agents* give customers flight information, sell tickets, assign seats, and check baggage. The personal contact with the public in this job is very important. It can make all the difference between a satisfied customer and a dissatisfied one. *Ramp agents* help guide airplanes into the gates using hand signals to pilots. They also load and unload baggage, freight, or mail. Other jobs in aviation include *flight instructors* who teach people to fly and *crop dusters* who fly over fields and spray them to aid growth of crops.

Flight attendants have to serve people graciously, but quickly.



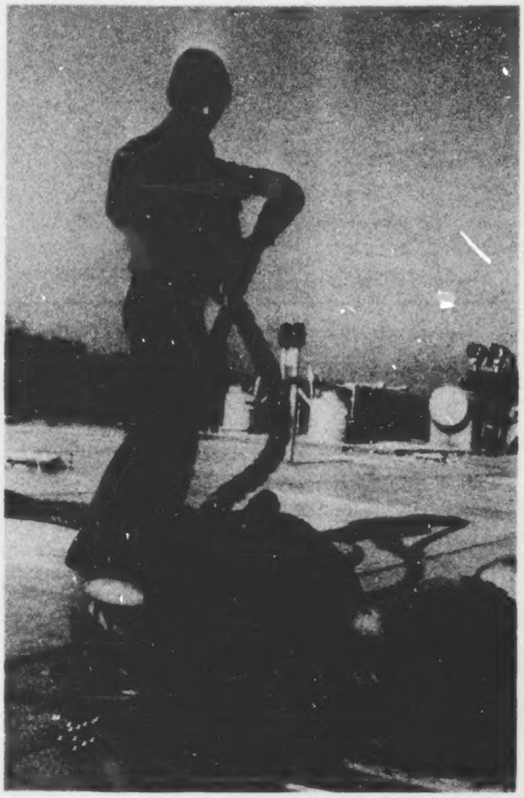
Commercial aviation offers jobs on the ground and in the air.

Merchant marine occupations. The maritime industry offers travel and adventure and many different kinds of work. Work aboard ship is divided among the deck, engine, and steward's departments; sailors in each of these departments do different things. The *captain* or *master* commands the ship and has complete authority over everyone and everything aboard.

The deck department is responsible for regulating the course, position, and speed of the ship; maintaining and repairing the hull and deck equipment; and loading, unloading, and storing cargo. New sailors in the deck department start out as *ordinary seamen*. They do general maintenance, such as scrubbing the decks and painting. *Able seamen*, those who steer the ship and do skilled repair work on deck, are the next rank. The *boatswain*, or bosun, is the top ranking able seaman. The deck officers, or "mates," include the *chief mate*, who is the captain's top assistant in assigning duties to the deck crew, and the *second and third mates*.

The engine department crew works below deck and runs all the engines and machinery. It includes workers at all skill levels. *Wipers* are beginning level sailors who keep machinery clean. Other sailors include *oilers*, who lubricate and maintain equipment, and *fire-watertenders*, who check gauges on the ship's boilers. Other engine crew members include the *electrician* and the *refrigeration engineer*. The *chief engineer* is in charge of the engine department, and has the help of the *first, second, and third assistant engineers*.

The steward's department feeds the crew and maintains the living and recreation areas. Sailors in this department begin as *utility hands*, doing kitchen work such as scouring pots and preparing vegetables, and *mess attendants*, serving meals and taking care of the ship's living quarters. The *chief cook* plans and prepares the meals. The top sailor in this department is the *chief steward*, who is responsible for the meals and upkeep of living quarters. This is the only department head who is not an officer.



Experience in the Coast Guard or Navy may help get a merchant marine job.

Railroad occupations. The Nation's 200,000 miles of railroad track are an important means of moving people, food, and goods among our cities and towns. Over half a million people are employed to operate trains and keep them in top working condition. *Conductors* are in charge of running the train. Their primary concerns are safety and running on time. On passenger trains, conductors collect tickets and fares as well. Conductors are always in communication with *locomotive engineers*, who work all the controls—such as acceleration and brakes—on the train. *Brake operators* work on trains and in railroad yards, making sure that trains are coupled (or linked) and uncoupled properly. They also inspect airhoses and handbrakes on all cars and assist the conductor when necessary. Other members of the train crew are *hostlers*, who help prepare the locomotives for their run, and *switchtenders*, who throw track switches in railroad yards. But many others are responsible for seeing that trains run efficiently. Shopworkers are the skilled employees who build, maintain, and repair railroad cars and other equipment. Some of these workers are *machinists, electrical workers, car repairers, sheet-metal workers, boilermakers*, and *blacksmiths*. To direct train movement and assure train safety, *railroad signal workers* install, maintain, and repair the communications and signaling systems. *Track workers* inspect and regularly maintain railroad tracks. They also put down new track when it is needed. *Dispatchers* work in stations along the railroad lines, sending messages to train crews by way of *telegraphers, telephoners*, and *tower operators*. These messages contain such things as track conditions and routing instructions. *Station agents* are the railroads' contact with the public. They offer information and try to get new business for the company.

Transportation Occupations

Applicants for truckdriving jobs must have good driving records.

Driving occupations. Truck, bus, and taxi drivers move passengers and goods over the Nation's highways and through the streets every day. More people than you might think are *local truckdrivers.* These are the people who drive moving trucks, newspaper trucks, mail trucks, freight delivery trucks, and other kinds of trucks in and around the city. Those who carry goods thousands of miles across the country in large trucks such as "18-wheelers" are known as *long-distance truckdrivers.* There are other kinds of drivers, too. *Taxicab drivers* operate without fixed routes or schedules and offer individualized service to passengers. *Local transit busdrivers* drive city and suburban routes to transport millions of Americans daily. They also collect fares and answer questions. *Intercity busdrivers* follow a route between communities, which may be on city roads or on highways or both. In small towns, these buses may be the only public transportation to other towns. Then there are support workers such as *traffic agents,* who try to get new business for companies, and *dispatchers,* who supply the drivers with scheduling and route information.

Personal Characteristics

Although it takes people with many different skills to keep our planes, ships, railroads, trucks, and buses on the move, transportation workers have certain traits in common.

Because of the millions of travelers who depend on them, transportation workers must be *conscientious* in their work and *pay close attention to detail.* The shopworkers who build and repair railroad cars, for example, must do their work carefully so that cars don't break down while they're in use. Air traffic controllers have to pay strict attention to guide planes safely on their proper course. Long-distance truckdrivers must stay wide awake and concentrate on driving for hours at a time. Sailors, drivers, pilots, and railroad engineers all need to be alert while they're on the job.

For many transportation workers, the ability to keep calm and *work under pressure* is important. Meeting schedules—delivering goods or people on time—is very important in the transportation industry. Yet storms, accidents, traffic tie-ups, and other unexpected situations crop up from time to time. Transportation workers have to be able to think quickly and act decisively in order to get things back on schedule as soon as possible.

An *easygoing personality* is an asset for transportation workers who are in direct contact with the public. Local transit bus and taxicab drivers, for example, must have the patience to deal effectively with passengers—the rude ones as well as the pleasant ones—and the steady nerves to drive in all traffic situations. Workers who sell tickets,

Taxicab drivers have to work in all kinds of weather.

answer questions, listen to complaints, or try to get new business need to be good at dealing with all kinds of people.

Some transportation workers need the *ability to work as part of a team.* In the merchant marine, for example, cooperation and interaction among the deck, engine, and steward's departments are essential for the "smooth sailing" of the ship. Not only do members of the ship's crew work as a team, but they eat, sleep, and socialize together too.

Others in transportation need to *be able to work independently.* Long-distance truckdrivers may spend days alone on the road. They must organize their time and set a steady speed in order to deliver goods on schedule.

The things that transportation workers do are not necessarily strenuous, but they require *good health and physical stamina.* Baggage attendants, for example, carry and load passengers' luggage on trains, buses, and airplanes. Parking attendants and flight attendants are on their feet and serving customers most of the time. Some jobs may not require much physical activity but demand excellent health just the same. Air traffic controllers, local and long-distance bus and truck drivers, and locomotive engineers are some examples. These jobs all require workers who are levelheaded and have steady nerves. In many cases workers must pass strict physical exams to enter these occupations.

A job in this field is likely to mean *working nights or weekends or on rotating shifts,* because transportation is not just a 9-to-5 operation. Many trucks, buses, planes, ships, and trains run 24 hours a day, 7 days a week.

Training

Through your hobbies or school activities you may already have begun acquiring skills that will lead to a career in transportation. Do you enjoy building and fixing things in your spare time? Mechanical aptitude and analytical ability are important in such occupations as airplane mechanic, able seaman, and locomotive engineer. Perhaps you are a ham radio operator. This hobby can provide a solid foundation for the training you'd need to become an air traffic controller or a railroad tower operator. You may have had the opportunity to sell tickets, collect money, schedule events, or give information to others. Can you think of transportation occupations that require these skills?

Formal training for transportation occupations varies a great deal. Detailed information on training requirements can be found in the Job Facts at the end of this chapter.

In some transportation occupations, the necessary skills are learned right on the job. In railroading and the merchant marine, for example, beginners start out as helpers and work their way up, a process that typically takes many years.

In railroading, workers typically learn their skills on the job.

Some transportation workers get their training in trade schools or technical institutes. Many airplane mechanics, for example, attend trade schools that provide practical job experience as well as classroom instruction. Long-distance truckdrivers also may train in this way.

If you're interested in a career in aviation, plan on attending college. A college degree—or at least several years of college training—is preferred for most aviation occupations, including pilot, air traffic controller, flight attendant, and reservation, ticket, or passenger agent.

In some transportation occupations, workers must have a license that demonstrates their expertise in the field. This is the case for airplane pilots, who must have a flying license certified by the Federal Aviation Administration, and for truckdrivers, busdrivers, and taxicab drivers, all of whom must have a State chauffeur's license.

Regardless of which transportation occupation you're interested in, you'll find a high school diploma an asset. Even in jobs that don't require it, advancement to more responsible positions often goes to those who have a diploma. High school courses in math and English are helpful for any of the transportation occupations. Other courses, such as machine shop, driver education, and public speaking, may be helpful for certain occupations.

Air Traffic Controller

As a ground controller, Mia Hensen is responsible for directing runway traffic.

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Exploring Careers

"Washington Tower, this is Global Airlines Flight 702. Request permission for takeoff."

Mia Hensen carefully checked the radar screen in front of her. It was filled with lines that represented airspaces, and moving blips, or symbols, that indicated planes. To the untrained eye, this large glowing screen would seem impossible to interpret. But to Mia, a veteran air traffic controller, checking traffic patterns and positions of airplanes from the radar screen was a routine part of every takeoff and landing.

After closely reviewing the radar screen, Mia turned her head slightly to the right where the flight strips were posted. These long strips of paper contained information about each flight that was due for takeoff, such as its destination and scheduled time of takeoff. They helped Mia get the waiting planes off the ground in the safest, most efficient manner.

"Cleared for takeoff, Global 702 ... Wind is from the southeast at 14 miles per hour," Mia radioed the pilot. At the same time, her fingers were punching out this information on the keyboard in front of her. It would then be relayed to the computer that kept track of all inbound and outbound flights.

Although she made it seem effortless, working her shift as ground controller—directing traffic down the runway and out of Washington National Airport—was a demanding job. Besides checking the pattern from the radar screen and the flight strips, there were dozens of other details running through Mia's mind. Every controller had to know the geography of the area as well as the weather conditions and visibility. Other facts, such as the size, weight, speed, and route of each airplane had to be considered in order to direct the outbound traffic safely and smoothly.

From the glass-enclosed airport tower, Mia watched Flight 702 gain speed down the runway. As the plane gracefully lifted into the air, she phoned downstairs to inform the department controllers. These air traffic controllers were responsible for watching aircraft and guiding them by radar for as much as 30 miles from Washington National Airport.

Mia was interrupted by the voice over the radio. "This is Pacifica Flight 445 ready for takeoff."

"Proceed down the ramp to runway 9, Pacifica 445," Mia radioed to the pilot a few seconds later. She then announced the wind and weather conditions.

The silence on the radio lasted no longer than 20 seconds. "This is Southern Airlines Flight 32 scheduled to leave for Miami at 4:57 p.m. We've had some problems in refueling and won't be finished for at least half an hour. I'm requesting a delay of 30 to 40 minutes."

"Roger, Southern 32 ... this is ground control. I'll reschedule your departure for approximately 5:40 p.m. Keep me posted if there are any further delays." As Mia spoke, her fingers raced over the keyboard in order to communicate this information to the computer.

Mia had just finished answering some questions about the expected weather conditions for this evening when a soft tap on the shoulder startled her. It was Manny McGinnis, who was waiting to relieve her.

"I like knowing that people trust me to make the right decisions."

"I didn't mean to scare you, Mia," Manny apologized, "but I couldn't get your attention. It's time to stand up and stretch for a few minutes."

The level of Mia's concentration was intense at this time of day, when traffic was at a peak.

"I didn't even hear you come in, Manny," Mia responded. She had been at her post as ground controller for about 2 hours now, but the time had passed very quickly.

Mia stood up and Manny slipped into her chair. She briefed Manny on the traffic situation, and then headed downstairs to relax.

Mia entered the employees' lounge, picked up a doughnut and a cup of coffee from a tray in the far corner of the room, and joined some others at one of the tables. She made an effort to relax her neck and shoulder muscles.

"Hi, Mia, how's it going?" Norman Walton greeted her. Norman was also an air traffic controller, and her tennis partner as well.

"Have you met George Foster? He's just completed training at the Federal Aviation Administration Academy in Oklahoma."

"Pleasure to meet you, George," Mia said as they shook hands. "Welcome aboard."

"Thanks a lot," replied George.

Norman smiled and said, "I was just trying to reassure George. I was telling him that directing air traffic at a metropolitan airport is not as scary as it seems at first."

"I must admit I am a bit nervous," acknowledged George. "I've had some experience in the military as a pilot and navigator, and then the training in Oklahoma. But to think that over 500 planes fly in and out of Washington National daily . . . !"

"Don't let it bother you, George," Mia responded. "It's not as though you have to direct all those planes yourself! Besides your military training is excellent background. And the on-the-job training you'll get here at Washington National is outstanding. Especially those "practice problems" that are programmed into the computer."

Norman added, "All you need to build up your confidence is a little time and experience. We all felt the way you do when we started out."

"I'm sure you're right," George replied. He glanced down at his watch. "I hate to run, but I'm due in the tower in 5 minutes. Thanks for the pep talk."

As he walked away, Mia recalled *her* first days on the job. She had not had military training, and some people had questioned her ability to handle the job without it. Mia had been sure that she could. That had been 7 years ago in Miami. Since then, she had worked in three different airports.

Mia and Norman chatted for a few minutes more.

"Some people questioned my ability at first, but I was confident that I could do the job."

These short breaks helped to relieve the tension and refresh the controllers for their next 2-hour shifts.

Mia finished the last of her coffee and then headed down the hall. She walked through a set of double doors and entered the approach control room from which incoming aircraft were being directed. A number of voices could be heard throughout the large room.

After a short briefing on the current traffic situation, Mia took her place behind a large radarscope keeping track of planes approaching from the East. Working as an approach controller now, Mia's duties included assigning planes to the proper courses and sending messages to the ground controllers (who directed planes from the runway to the gates) upon their arrival.

"This is Atlantic Airlines Flight 572 to Washington National," a voice said over the radio. "Request final approach instructions."

Mia turned to the circular radar screen and found the symbol that represented Atlantic Airlines 572 from among the flashes of light.

"Washington National approach to Atlantic 572," Mia said into the microphone. "Your position is 30 miles northwest of the airport. Expect approach to runway 9. Wind is from the east at 10 miles per hour."

"Roger, approach control," acknowledged the pilot.

Mia then gave the pilot direction and altitude instructions to bring the airplane close to the airport. When the flight was about 6 miles away, Mia said, "Atlantic 572 . . . cleared for approach. Call Washington tower now."

Assured that the plane was safely on the approach, she took a deep breath and then relayed the information to the computer and phoned ahead to ground control. Having finished that, Mia could now answer a call from a Central plane that was waiting. "Go ahead, Central 324."

"This is Central 324," the pilot responded. "I'm in a holding pattern at 8,000 feet. I've been informed that runway 6 has been closed temporarily and would like further instructions for landing."

Mia followed the regular procedures and directed the pilot down runway 9.

She leaned back in her chair for a moment to relieve the tension from her lower back. However, what appeared to be an unmarked symbol flashed on the radar screen. This brought Mia back to the edge of her seat to take a closer look. She watched the symbol fade to the right and disappear off the edge of the screen. Immediately Mia phoned Teressa Williams, the approach controller directing incoming traffic from the south. Teressa had just picked up the flash on her screen.

"I'll try to establish contact with the aircraft and then get back to you," she told Mia.

A few minutes later, Teressa phoned and explained that the "mysterious flash" they had both seen was a small private plane that hadn't bothered to radio in.

"I directed it in safely, though. I also made it clear to the pilot that he should have called and told us where he was!"

"I just don't understand why some pilots don't use their common sense," observed Mia.

The pace of the traffic slowed as the evening rush ended. Mia continued giving directions and answering questions, always alert for the unexpected. Before she knew it, Bert Johnson came by to relieve her.

"Is it that time already?" Mia asked. She looked down at her watch, which read 7:30. Just then her stomach let out a growl. Mia smiled at Bert and said, "Well it looks like my stomach knows what time it is! I guess I'll get some dinner now."

Exploring

Air traffic controllers must have confidence in their judgment as well as the ability to make decisions quickly.

- Can you make decisions on your own? Are you willing to take the responsibility for your decisions?
- Do you trust your own judgment?
- Do friends often confide in you?

Air traffic controllers must be able to see objects on a two-dimensional screen and visualize them in the air.

- Can you read and understand graphs, diagrams, and charts?
- Can you look at a drawing and picture the three-dimensional object in your mind?
- Do you ever put together models?
- Are you good at solving geometry problems?

Air traffic controllers are subject to stress and tension when they're on the job. They must be able to keep calm and be able to concentrate under pressure.

- Are you able to organize your thoughts during tests even though you may be nervous beforehand?
- Do you usually perform well at crucial moments—for example, the big play in a ball game?
- Are you good at giving reports in front of the class?

Air traffic controllers must have a good memory for detail. They must remember wind and weather conditions, geography, and the size and speed of planes when giving directions.

- Do you remember people's names easily?

Transportation Occupations

- Can you relate an exact conversation the next day?
- Can you remember what you ate for lunch yesterday?

Air traffic controllers often have to work early in the morning or late at night. To keep up with these demands, they must be in good physical condition and have stamina.

- Do you enjoy jogging, bicycling, hiking, backpacking, climbing, basketball, and other active sports?
- Do you enjoy dancing? Gardening?
- Do you like being active most of the time?

Suggested Activities

Join the Civil Air Patrol. This organization, supported by the Air Force, exists in every State. Membership is open to those who are at least 13 years old. The Civil Air Patrol offers its members the opportunity to fly and to learn about the aerospace industry. Some of the subjects studied are navigation, aerodynamics, and electronics. For more information, call the "Civil Air Patrol" listed in your phone book.

Join a Transportation or Aerospace Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, try for merit badges in Aviation, Communications, and Weather.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops also offer opportunities to try out careers through internships and service aide and community action projects, and proficiency badges in a number of areas including Aviation and Weather.

Ask your teacher to talk to the manager of your local airport and arrange for a class tour of the airport.

Prepare a report for a science class on the differences between an airport traffic controller (who guides planes in and out of the airport) and an en route controller (who keeps track of planes between airports).

What sort of followup occurs after a plane crashes? Use this topic for a report in a science or social studies class. You might begin your research in the library. You also can write for information to government agencies such as the Civil Aeronautics Board and the Federal Aviation Administration. Officials of your local airport may be willing to talk to you or come and talk to your class about how they investigate plane crashes.

Try to increase your ability to observe and remember details. Some things you can do include recalling people's names and phone numbers and playing cards.

Prepare a report for your science class on the kinds of weather conditions that permit or cancel a flight. Bring in and explain a flight weather chart.

Spend time on hobbies in which you learn about aviation. Some activities include building model airplanes, reading about aviation, and taking flying lessons. Learn the characteristics of different planes.

Prepare a report on the history of air travel for a social studies class.

Become familiar with electronic communications equipment. Become a ham radio operator. Learn how radar works.

Related Occupations

The air traffic controller is one of a team of workers in the sky and on the ground who follow each plane from takeoff to landing. They ensure a safe, smooth flight. Below are 13 of these occupations. See how many of them you can unscramble.

1. PLAENARI CHINMAEC
2. PLAENARI NTAIEMNNCEA REWC
3. GGABGEA NAERLDH
4. POICTLO
5. DIPATSCHRE
6. CEETCILSRON TCHCINIANE
7. NE TOURE TFFAICR CLLERONRTO
8. GHLIFT TTEANADNT
9. GHLIFT GIEENREN
10. SSEGNERPA GEANT
11. TOIPL
12 SERVEARITON NGAET
13. CKTEIT NGAET

See answers at end of chapter.

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Railroad Passenger Conductor

Together, Charlie and Max have more than 60 years of railroad experience.

Transportation Occupations

It was a crisp spring morning, not yet dawn. Charlie Campbell, in his freshly pressed white shirt and dark tie, was on Track B giving the final inspection to train 171, scheduled to leave for Washington in 10 minutes. As conductor of the Baltimore-Washington commuter run, Charlie was responsible for the train. He liked to check the railroad cars to make sure they were in top running condition before the train left the station. To do this, Charlie reported for work promptly at 5:30 a.m. every morning, a full 30 minutes before the train made its first run.

Charlie had a routine he followed daily to prepare the train and its crew for departure. After signing in, Charlie reported to the dispatcher to pick up his copy of the train's orders. Then he headed out to the tracks to check the condition of the train and greet his crew.

"Morning, Jim . . . morning, Max. How's everything look?"

Charlie confers with Jim Beall, the locomotive engineer.

"Should be about set," replied Max Spiegel, the brake operator. "She's all fueled and the cars are coupled. Right now I'm going to check the tail markers."

"Good work, Max."

Charlie then turned to Jim Beall, the locomotive engineer, who was up in the cab eyeing the brakes and other controls. "Have you had a chance to look over the orders?"

"Yes, Charlie," Jim responded. "Doesn't look like we should have any delays. Track and weather conditions both are excellent."

"Good," said Charlie. "We should be ready to roll in about 15 minutes." Charlie and Jim synchronized their watches at exactly 5:48 a.m.

Passengers were boarding the train now. Charlie climbed aboard so that he could doublecheck the lights and other equipment. Everything looked fine.

"All aboard!" called Charlie as the last few passengers hurried down the platform.

With everyone safely seated, Charlie pulled the last door shut. Then he gave the engineer the go-ahead.

"Move her out," Charlie said to Jim over a two-way hand radio. They would communicate by radio frequently during the run.

"Have your tickets ready, please," Charlie announced as he began down the aisle of the first car to collect tickets and fares. Most of the faces were familiar ones, as many of the passengers were daily commuters who had been riding the 171 as long as Charlie had been its conductor.

"Excuse me," said a middle-aged man as Charlie made his way down the aisle. "Will the train be on its normal schedule next week on Memorial Day? Or do you have a holiday schedule? I'm new in town and don't know the train schedules around here."

"Well, sir, we do have a holiday schedule and that's what we'll be using on Memorial Day," replied Charlie. "By the way, you can pick up the schedule for all our Baltimore-Washington commuter runs at the station. Just ask any of the ticket agents."

"Thanks a lot, I'll do that."

"Not at all," Charlie said with a slight smile. He got a feeling of satisfaction from helping passengers.

The train rode along smoothly, making stops at Elkridge, Columbia, and St. Dennis. At each stop, Charlie collected tickets and fares, working his way from the first car back to the third.

"Sir . . . ," Charlie heard a woman calling loudly from the rear of the car. He moved quickly down the aisle.

"Can I help you, ma'am?"

"You certainly can! Would you tell this gentleman to put out that smelly cigar? I've tried to ask politely, but as you can see he has ignored me."

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"I'm afraid you're going to have to put your cigar out, sir. If you want to smoke, the next car is the smoking section on this train," Charlie said politely but firmly.

With a sour look on his face, the man said, "Okay, okay, I'll put it out. But if you ask me, her manners are worse than my cigar is!"

Charlie felt that it would be best to separate the two passengers before one or both of them completely lost their temper. "There are a few empty seats up front, sir. You'd probably be more comfortable if you moved to one of those. Then, if you want, you can move to the smoking car at the next stop."

"That suits me just fine," he replied as he picked up his briefcase and headed up the aisle.

"Now that that's cleared up, I hope you can relax and enjoy the rest of the trip, ma'am," Charlie said as he breathed a slight sigh of relief. He then walked up to the man and thanked him for being cooperative.

He had never taken a course in psychology or supervision, but Charlie knew he was good at working with people. He had the tact and judgment to deal with people successfully—the train crew as well as the passengers.

The train chugged on ... Odenton, New Carollton, and Cheverly. Almost every seat was taken now.

The next stop, the last one, was College Park. It was usually one of the more crowded stops along the route to Washington. As the train came to a halt, Charlie opened the door of the first car and lowered the steps. He stepped onto the platform and announced, "Have your tickets ready, please," so he could board the passengers and check their tickets in the most efficient way. Most of the passengers were regular riders. They greeted Charlie, showed him their weekly or monthly passes, and stepped onto the train.

At exactly 6:48 a.m., the 171 pulled into Washington's Union Station. Charlie and Max helped the passengers down the steps and onto the platform.

The train empty now, they both climbed back onto the first car and each sank into a seat. "I'd say we had about 200 paying customers on that run," Charlie offered.

Max calculated out loud and nodded his head. "Let's see ... all the seats filled, that is 65 times 3 cars or 195 ... and about half a dozen standing. Yes, that seems about right to me."

Next, Charlie counted the number of tickets sold and then added up the money collected. He made notations in his notebook which would help in writing his report tonight after the last run.

With a few minutes left before the return journey to Baltimore, Charlie and Max relaxed and began to chat.

"You know, I thought working the commuter line was

Charlie knows many of the commuters by name.

going to be a breeze after 27 years on freight trains," Max said. "It isn't as physically demanding as work on a freight train, I'll say that. But the business of collecting fares, answering questions, and keeping the passengers happy certainly keeps me on the go."

Charlie nodded in agreement. "And keeping the passengers happy is no easy job!" he said. "Two of my passengers got into an argument this morning because one was smoking and it bothered the other one."

After a comfortable silence, Charlie began to reminisce. "You know, I started working for the railroads 36 years ago. I began right after high school as a substitute brake operator in a switching yard. It was tough work, blistering hot summers and winters so cold they'd numb your fingers and toes. After a year and a half, I became a regular, and 4 years after that I got promoted to a passenger brake operator. Like you, I expected the work on a passenger line to be easier."

"Tell me more," Max said.

"Well, after 22 years as a brake operator, 10 years as a freight train conductor, and over 4 years as a passenger conductor, I guess I've learned that things don't get easy. After all those years, I still get to work at 5:30 each morning, make three morning and three evening runs, have a daily layover in Washington, and don't get home until 8:00 each night!

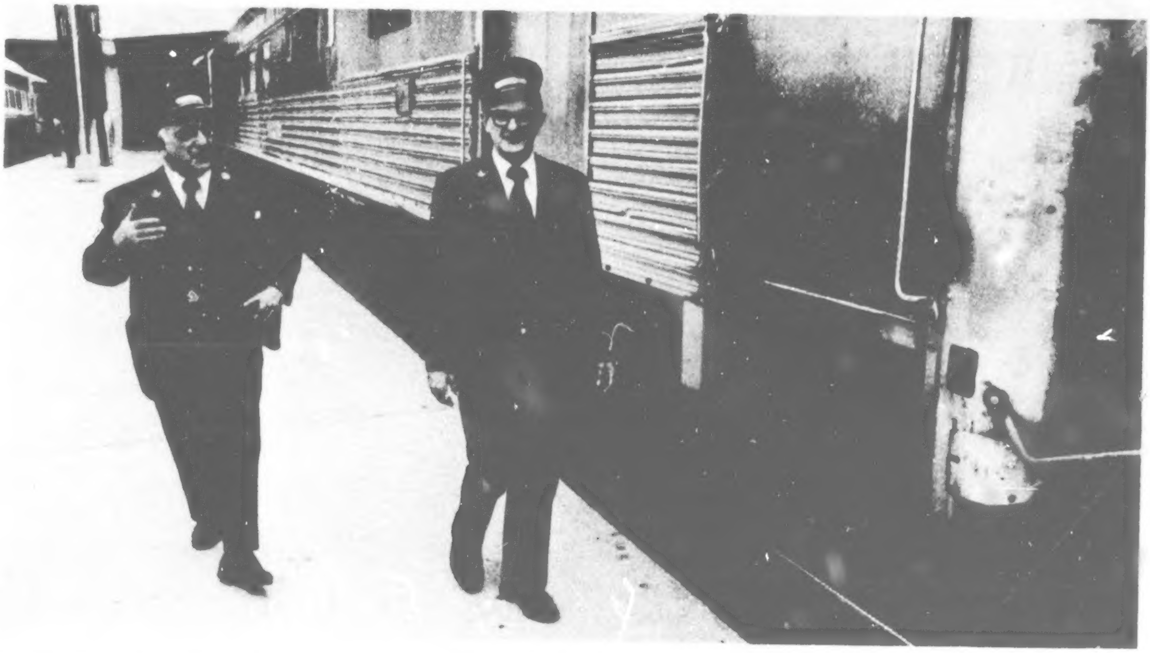
"I must admit, though, that I wouldn't trade this job for anything else in the world. There are so many rewards. I like working with people as well as machinery. I enjoy the responsibility and freedom I get on the job. There's no close supervision. And there's the 5- or 6-hour layover each day in Washington, when I can catch up on my sleep, read a good book, take in a movie, or anything else I want to do." Charlie paused for a moment. "Yes," he said, "Working on the railroad is more than just a job to me, it's a way of life!"

Glancing down at his watch, Charlie noticed it was nearly 8 o'clock. "I could probably go on talking for hours, but we'd better prepare for the next run."

Exploring

Conductors are in charge of running the train. They are responsible for the care and comfort of the passengers, for directing the other members of the train crew, and for making sure the train runs safely and on time.

- Have you ever been responsible for the care of others—babysitting, for example?
- Have you ever organized a school club or been an officer of the student government?



"Working on the railroad is more than just a job to me, it's a way of life," says Charlie.

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- Have you ever taken care of pets or plants for your neighbors while they were out of town?

Conductors must be tactful and courteous when dealing with passengers. This can include anything from giving out information to dealing with a passenger who doesn't have enough money for the fare. The conductor is the railroad's representative to the public.

- Have you ever been the spokesperson for your class or school club?
- Are you good at settling arguments among your friends?
- Can you remain calm and courteous, even when people irritate you or something troubles you?

Conductors must have an eye for detail. They must make sure all cars are clean and have been properly coupled. At the end of each run they must report such things as the number of passengers, track conditions, and departure and arrival times.

- Do you enjoy working with numbers?
- Do you like to play games where you must find hidden objects or words?
- Do you like to put together puzzles?
- Can you read maps easily? Can you find a place on a map quickly?

Conductors must be flexible about their work schedules. The job may call for time away from home.

- Have you ever spent a few weeks away from your family—at camp or visiting relatives, for example?
- Do you like to stay overnight with friends?
- Can you find plenty of things to do with free time?

Conductors must understand how the train operates. This takes mechanical ability.

- Do you have any hobbies in which you build or repair things? Have you ever done woodworking, sculpting, carpentry, or put together models?
- Have you ever tried to fix your bicycle or replace a fuse or a light switch?

Suggested Activities

Take a train ride if there is a railroad line in your town. If the train is not very crowded, talk to the conductor about the work.

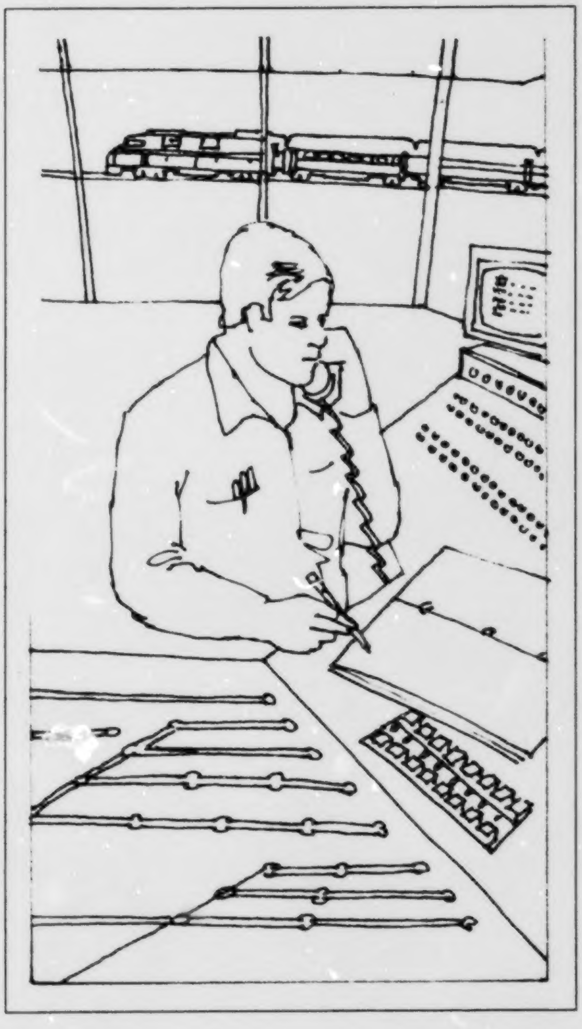
Find out the difference between a passenger train conductor and a freight train conductor.

To get experience in handling money and selling tickets, volunteer to sell tickets at a school play or dance.

Role-play a passenger conductor on a commuter run. Include some common situations, such as a passenger who needs scheduling information and a passenger who doesn't have enough money for the fare.

Join a Transportation Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for information on careers in railroading to the Association of American Railroads, American Railroads Building, 1920 L Street, N.W., Washington, D.C. 20036.



Transportation Occupations

Related Occupations

Besides the conductor, many others work to ensure that the train runs safely and smoothly. Hidden in the puzzle below are 15 of these occupations. See how many you can find. The words may be forwards or backwards, either horizontal or vertical.

BLACKSMITHS
BOILERMAKERS
BRAKE OPERATOR
CAR REPAIRERS
DISPATCHER
ELECTRICAL WORKERS
ENGINEER
MACHINISTS
SHEET METAL WORKERS
SIGNAL INSTALLERS
SIGNAL MAINTAINERS
STATION AGENTS
TELEGRAPHERS
TOWER WORKERS
TRACK WORKERS

E	L	E	C	T	R	I	C	A	L	W	O	R	K	E	R	S	T	E	L	W	E	G
D	B	R	S	R	E	K	A	M	R	E	L	I	O	B	A	L	T	I	M	O	Q	B
E	I	O	H	T	I	B	R	A	K	E	O	P	E	R	A	T	O	R	R	R	D	L
B	W	T	S	E	N	S	R	V	E	S	T	S	I	N	I	H	C	A	M	K	I	A
R	E	E	N	I	G	N	E	H	O	L	L	Y	W	L	S	A	C	K	E	E	S	C
T	E	L	E	G	R	A	P	H	E	R	S	G	A	S	M	I	S	H	I	B	P	K
S	T	A	T	I	O	N	A	G	E	N	T	S	B	A	S	M	I	T	Y	L	A	S
E	Z	G	S	R	E	N	I	A	T	N	I	A	M	L	A	N	G	I	S	A	T	M
A	N	W	T	O	W	E	R	W	O	R	K	E	R	S	O	T	G	N	W	C	C	I
R	Q	G	S	T	A	I	E	N	B	M	A	C	H	P	N	S	V	U	Q	O	H	T
B	E	T	I	L	A	T	R	A	C	K	W	O	R	K	E	R	S	Y	M	R	E	H
E	R	X	K	R	O	W	S	I	G	N	A	L	I	N	S	T	A	L	L	E	R	S
Z	S	H	E	E	T	M	E	T	A	L	W	O	R	K	E	R	S	U	O	Y	P	X

See answers at end of chapter.

Exploring Careers

Bus Driver

Priority Seating

In 4 years of driving a bus, Betsy Hanratty has learned how important it is to be calm in dealing with customers.

A pleasant smile appeared on Betsy Hanratty's face as she greeted Dan Martin. Dan was a regular customer on the X-2 bus that ran from Hillside into the city every morning.

"Looks like it's going to clear up this morning ... should be a beautiful weekend," Dan remarked as he dropped two quarters into the coin machine. He took a few steps down the aisle and chose the first empty seat.

Behind Dan, another half dozen passengers followed, most of them also on their way to work. One by one, they deposited their coins and moved back.

Once all the riders were safely on the bus, Betsy grabbed the handle that was connected to the door and pulled it towards her to close the door. Out of habit, she glanced up at the rearview mirror that gave her a full view of the interior of the bus. Next, Betsy checked the sideview mirrors on both sides of the bus and turned her head to take a quick look at the traffic. This allowed a complete view that Betsy felt was necessary before she pulled away from the curb and joined the flow of traffic.

Light chatter could be heard throughout the bus, which was about one-third full now. Many of the passengers, however, settled back and read the morning newspaper or a book.

Betsy continued on her way, stopping every block or two to pick up passengers. The morning rush hour traffic was heavy, as usual, but moved at a steady pace. The early morning fog had lifted, and the sun was beginning to break through the clouds. Betsy reached to the panel on her right and picked up her sunglasses, which had been resting between the buttons marked "Defroster" and "Hi-Beam Lights".

A young woman with two children stepped onto the bus. "Does this bus go to Greenwich?" she asked in a shy voice.

"No, ma'am," Betsy responded. "The X-2 only goes as far as Cedar Crossroads. You can take this bus if you want, but you'll have to transfer at Cedar Crossroads to get to Greenwich. Or, if you want to wait, the X-18 will be by in about 20 minutes. That one goes all the way to Greenwich."

"Are you sure this doesn't go to Greenwich? My sister

"When I first started driving, I figured that being in traffic all day would take the most patience. But hectic traffic is nothing compared to some of the people I meet."

told me to catch the bus at 7:15 at the corner of 35th and Wilson Boulevard. She said that one would take me to Greenwich."

"I'm sorry, ma'am, but I'm only going as far as Cedar Crossroads. You can ride this bus if you'd like; the transfers will cost 10 cents extra apiece."

"But I know my sister can't be wrong. She rides the bus all the time."

"Well, ma'am, you must decide what you want to do now. By the way, next time why don't you telephone for bus information? That way you will be sure to get the correct bus routes and time schedules."

The young woman, still looking bewildered, opened her purse and took out some coins. "How much is children's fare?"

"Thirty-five cents, plus ten cents extra if you want to buy a transfer. That comes to a total of $1.50 for all three of you."

As the coins fell to the bottom of the coin box Betsy tore three transfers from a booklet attached to the box. The women moved to the back of the bus and Betsy breathed a slight sigh of relief. After 4 years of driving a city bus, Betsy had learned to be calm and courteous in dealing with customers. She also had learned to answer all questions and complaints politely, but firmly. "It's funny," she thought, "when I first started driving, I figured that being in traffic all day would take the most patience. But hectic traffic is nothing compared to some of the people I meet!"

In the next few stops, all the seats filled up. The pace of the traffic slowed as the X-2 approached the city. The road became more crowded, and Betsy instinctively became more cautious about her driving. Too many times, Betsy had seen drivers make a last-minute decision to turn—not paying any attention to the fact that they were in the wrong lane or that the traffic light was red. Betsy felt that a good driver must be a defensive one. She took pride in her own fine driving record.

The bell rang frequently between stops, signalling to Betsy that a passenger wanted to get off at the next stop. Occasionally, she glanced at her watch to make sure she stayed on schedule. Along with safety, Betsy considered being on time a very important part of the job.

Up ahead, Betsy saw that a delivery truck was stopped in the right lane with its lights flashing. This meant that the driver was delivering goods nearby and would return shortly. Being able to see "trouble spots" in plenty of time was one of the advantages Betsy enjoyed because, in driving the bus, she sat quite a bit higher off the ground than most of the other drivers in the traffic. Whenever she could, Betsy would plan ahead to minimize her delays.

"Good morning, Mrs. Goddfrey," Betsy greeted the elderly woman who was boarding the bus. Mrs. Goddfrey was one of the few patrons who rode the morning bus regularly on its return from the city out to Hillside. Three times a week, she volunteered at the YWCA.

"Hello, Betsy. Fine morning, isn't it?" the woman replied as she reached into her purse for the bus fare. "Oh, dear, I have forgotten my change purse. What shall I do?"

"Don't worry," Betsy replied kindly. She took some change from her pocket, deposited it in the coin box, and said, "You can bring me the money on Friday."

"You're a real lifesaver! You can trust me not to forget it on Friday." Mrs. Goddfrey made her way to the first empty seat.

The return run from the city to Hillside went quickly, as Betsy passed many of the bus stops along the route without having to stop and pick up passengers.

"Excuse me, ma'am, but does this bus go by St. John's Hospital? It's on the corner of Fourth and Pine Streets," asked a well-dressed man as he stepped onto the bus.

"Yes, it does, sir. If you'd like, I'll call out that stop as we get to it," Betsy replied.

"That would be very helpful, thank you," he said as he dropped some coins in the box. "By the way, what's a pretty little girl like you doing in a job like this?"

"What do you mean? I can handle this bus as well as anyone," she replied good-naturedly.

"In fact," she thought to herself, "I can handle it better than most. After all, when I applied for the job of a busdriver, I had over a year's experience driving a delivery truck for a dry cleaner's. And in the training program the bus company gives, I had the best grades in my class—both on the written exam and in driving skills! Not bad at all."

Meanwhile the man bound for St. John's had found a seat at the back of the bus.

The rest of the trip was smooth, with no major problems or traffic delays. In fact, at one point Betsy had to make an effort to pace her driving so as not to get ahead of her schedule. She didn't want to pass any of the bus stops early and take the chance of leaving a passenger behind.

After this run was finished, Betsy drove about a mile to the garage, where she checked in with the dispatcher. This included reporting the runs she made that morning, counting the fares collected, turning in her booklet of transfer slips, recording the number of transfers given out, and reporting special problems or delays. Since Betsy worked a split shift—from 5:30 to 9:30 a.m. and later from 4:00 to 8:00 p.m.—she did not have to write up her reports until later that evening.

Exploring

Busdrivers must be easygoing and even-tempered to be able to deal with all kinds of passengers, weather conditions, and traffic problems.

- Can you control your emotions when everything seems to go wrong?
- Can you keep your temper when an umpire calls you out and you thought you were safe?
- Can you remain calm and courteous, even when people irritate you or something troubles you?
- Can you make your case calmly when a teacher gives you a grade that you think is unfair?

Busdrivers must be safety conscious and follow traffic regulations in delivering passengers safely to their destinations.

- Do you look both ways before you cross the street?
- Do you obey traffic regulations, such as riding your bicycle with the traffic and only crossing at a crosswalk?

Betsy feels that a good driver must be a defensive one. She takes pride in her good driving record.

Exploring Careers

- Have you ever been responsible for the care of anyone else—babysitting, for example?

Busdrivers are generally free from close supervision while at work. They must be able to drive their routes, stay on schedule, and handle any emergencies on their own.

- Do you do your homework without being told to?
- Do you clean your room or help with chores around the house without being told to?
- Are you generally on time for class or for meetings?
- Do you budget your time?
- Would you know what to do in case of a fire or other emergency at home?

Busdrivers must have good driving ability to maneuver the bus in heavy traffic. This includes good eye-foot-hand coordination, quick reflexes, and good depth perception.

- Can you ice skate, ride a skateboard, or ride a bicycle?
- Are you a good bowler?
- Can you pitch, hit, and catch a softball?

Suggested Activities

Compare a bus ride through town during rush hour to a ride in the middle of the day. Notice the differences in the amount of traffic, the cost of the trip, the number of passengers, and how long it takes to get from one place to another. What other differences do you observe?

Learn to recognize the symbols on road signs and how to follow them.

Many people rely on buses to get around town. Buses offer many advantages, including relatively low cost, convenience, and the peace of mind of not having to drive yourself. Other ways to travel around town include cars, bicycles, and taxicabs. Make a list of the advantages and disadvantages of each.

Find out what types of bus services are available in your community. You can start by looking in the yellow pages of the telephone book.

Invite a representative from a bus company in your area to speak to your class about training requirements and job opportunities for busdrivers in your community. Prepare questions in advance.

Learn how to change a flat tire and handle other common repairs on your family car.

Learn how to read maps of your city and its surrounding areas. In this way, you can become familiar with the main streets and famous landmarks.

To become familiar with handling a motor vehicle, learn how to drive a sit-down power lawnmower, a minibike, or a boat if any of these are available.

Join an Auto Mechanics, Road Rally, or Transportation Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Role-play a bus driver on his or her route. Include such common problems as a passenger who does not have enough money for the fare, a passenger who needs information, and a passenger whose conduct is disturbing others on the bus.

Related Occupations

See how many of the following workers you can match with their job duties. Like the local transit busdriver, they are all involved in carrying people or goods over our highways and city streets.

1.	Local truckdriver	a.	Transports sick or injured people to the hospital.
2.	Route driver	b.	Drives a group of passengers from one town to another.
3.	Ambulance driver	c.	Drives children to school in the morning and back home in the afternoon.
4.	Long-distance truckdriver	d.	Moves goods from terminals and warehouses to factories, stores, and homes in the area.
5.	Chauffeur	e.	Paid and licensed driver of a private motor car.
6.	Long-distance busdriver	f.	Delivers goods from the place of business to the customers May collect payments or try to sell the company's services.
7.	Taxicab driver	g.	Picks up passengers at any location (often getting the information over a two-way radio) and drives them directly to their destination.
8.	School busdriver	h.	Travels along turnpikes and highways carrying goods between terminals that are thousands of miles apart.

See answers at end of chapter.

Job Facts

There isn't room in this book for a story about every transportation occupation. However, you'll find some important facts about 21 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
AIR TRANSPORTATION			
Air Traffic Controllers	Controllers keep track of planes on the ground and in the air, and give pilots instructions to keep planes on course and prevent accidents or delays. All civilian air traffic controllers work for the Federal Government as employees of the Federal Aviation Administration (FAA). They work in the control towers at airports and at control centers along air routes throughout the country.	Controllers must be in excellent health and pass a yearly physical exam. They should be articulate, since directions to pilots must be given quickly and clearly, and have a decisive personality. Applicants must have 3 years of work experience or 4 years of college, or both. Civilian or military experience as a controller, pilot, or navigator is an asset. Successful applicants receive both on-the-job and formal training. It usually takes 2 to 3 years to become a fully qualified controller.	Controllers work a basic 40-hour week. Because control towers and centers operate 24 hours a day, 7 days a week, controllers are assigned to night and weekend shifts on a rotating basis. Controllers sometimes work under great stress. They must keep track of several planes at a time and make certain all pilots receive correct instructions.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Airplane Mechanics	Mechanics keep planes in top operating condition. They inspect and maintain planes on a regular schedule and make repairs. Over half of all mechanics are employed by the airlines, working near large cities at the airlines' main stops. Others work for the Federal Government, mainly at military bases, or for small repair shops at airports throughout the country.	Most mechanics learn their job in the Armed Forces or in trade schools certified by the FAA. Trade school courses last about 2 years. Most of the mechanics who work on civilian aircraft are licensed by the FAA. Unlicensed mechanics are supervised by those with licenses. Experience in automotive repair or other mechanical work is helpful, as are high school courses in mathematics, physics, chemistry, and mechanical drawing. Mechanics must have strength and agility to lift heavy parts and do climbing and reaching.	Mechanics sometimes must stand or lie in awkward positions when making repairs. Work areas are noisy when engines are being tested. Many mechanics are union members.
Airplane Pilots	Although most pilots fly planes that carry passengers and cargo, some do crop dusting, inspect power lines, or do aerial photography. Most pilots work at major airports. About half work for the airlines, and the rest work for private businesses and the government.	All commercial pilots must be licensed by the FAA. To receive the license, they must pass a written and physical exam and demonstrate flying ability. Flying is taught in military or civilian flying schools. Either kind of training satisfies requirements for licensing, but Armed Forces pilots have the opportunity to gain experience on jet aircraft that is preferred by airlines and many businesses. College graduates are preferred for airline jobs. New airline pilots usually start as flight engineers.	Pilots must be able to make quick decisions and accurate judgments under pressure; the mental stress of being responsible for a safe flight can be tiring. Pilots cannot fly more than 85 hours per month. Most flights involve layovers away from home. Work schedules often are irregular. Most airline pilots are union members.
Flight Attendants	Flight attendants help make the passengers' flight safe, comfortable, and enjoyable. Most flight attendants are stationed in major cities. Large numbers work out of Chicago, Dallas, Los Angeles, Miami, New York, and San Francisco.	Poise, tact, resourcefulness, and a pleasant manner with strangers all are important traits. Applicants must be high school graduates. Those with some college, nurses' training, or experience dealing with the public are preferred. Most large airlines give newly hired flight attendants about 5 weeks of training in their own schools.	Attendants usually fly 80 hours per month or less but may devote up to 35 more hours on the ground to prepare for flights. They may have to work nights, weekends, or holidays. Most are union members.

Transportation Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Reservation, Ticket, and Passenger Agents	These workers reserve seats, sell tickets, and help passengers board planes. Most agents work in downtown offices or at large metropolitan airports.	Because agents deal directly with the public, airlines seek pleasant, personable, attractive applicants. A good speaking voice is essential. A high school diploma is required and some college is preferred. New employees usually receive about a week of classroom instruction to learn how to use the flight schedule book and the computer. Once they are on the job, at least 3 weeks of close supervision by an experienced worker are needed before they can handle the job alone.	Work schedules may be irregular. During holidays and other busy periods, agents may find the work hectic. Many agents belong to unions.
RAILROAD OCCUPATIONS			
Brake Operators	Brake operators couple and uncouple cars and operate track switches in railroad yards. They also look for faulty equipment and make minor repairs.	Brake operators need to be in good physical condition and have mechanical aptitude to operate switches and handbrakes and to board moving trains. Employers prefer high school graduates. Skills are learned on the job and it takes about a year to learn them thoroughly. It usually takes several years, however, before brake operators have enough seniority to get regular assignments.	Brake operators may have to work nights, weekends, and holidays. Those who don't have regular assignments may be called to work on short notice. The job often calls for time away from home. Most brake operators are union members.
Conductors	Conductors are in charge of train and yard crews. They must make sure passengers and cargo are delivered safely and on time.	Qualified brake operators are promoted to conductors on a seniority basis. They must pass exams covering signals, timetables, operating rules, and related subjects. Until permanent positions become available, new conductors substitute for experienced conductors who are absent.	Conductors may have to work nights, weekends, and holidays. The job often calls for time away from home. Since most freight trains are unscheduled, freight conductors may be called to work on short notice. Many conductors are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Locomotive Engineers	Engineers operate the throttle to start and accelerate the train and use airbrakes to slow and stop it. They also watch gauges and meters that measure speed, fuel, battery charge, and air pressure in the brake lines.	Openings for locomotive engineers are filled by promoting engineers' helpers on a seniority basis. Helpers qualify for promotion by proving their ability to operate locomotives and by passing a written exam. For engineer helper jobs, railroads prefer applicants who are high school graduates and at least 21 years old. They must have good hearing, eyesight, and color vision. Good eye-hand coordination, manual dexterity, and mechanical aptitude also are required. Helpers receive on-the-job training that lasts about 6 weeks.	Locomotive engineers may have to work weekends and holidays. The job often calls for time away from home. Since most freight trains are unscheduled, freight engineers may be called to work on short notice. Most engineers are union members.
Shop Trades	Every railroad employs its own workers to maintain and repair cars and other equipment. These skilled workers include car repairers, machinists, electrical workers, sheet-metal workers, boilermakers, and blacksmiths. They work in railroad yards, terminals, and engine houses, as well as in locomotive repair shops.	Apprenticeship training is the most common way of entering the railroad shop trades, although some workers learn on the job and are upgraded from jobs as helpers and laborers. Applicants who have had shop training in high school or vocational school are preferred. Automobile repair and machining courses are useful for machinists. Courses in electricity and physics will help those who want to be electrical workers.	Shop work is active and strenuous. It involves stooping, lifting, and climbing. Some workers may face noisy shop conditions. Other workers, such as car repairers, must work outdoors in all kinds of weather. Most shop workers are union members.
Signal Department Workers	Railroad signal workers install, repair, and maintain the train control, communication, and signaling systems that direct trains and assure safety. These include gate crossings, signal lights, and switches.	Applicants who are high school or vocational school graduates are preferred. Courses in blueprint reading, electricity, and electronics provide a helpful background. Applicants also should be able to do heavy work. New workers are assigned as helpers to experienced workers. After 60 to 90 days of training, they may advance to assistants. After another 2 to 4 years, qualified assistants may be promoted to signal installers or maintainers.	Since they work over large sections of track, installers usually live away from home during the workweek, frequently in camp cars provided by the company. Maintainers usually live at home and service signals over a limited stretch of track. However, they must make repairs regardless of weather conditions or time of day. Most signal installers and maintainers are union members.

Transportation Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Station Agents	Station agents are the customers' contact with the railroad. They take customer orders, arrange a delivery schedule, inspect merchandise, and prepare customers' bills. At passenger stations, agents supervise and coordinate selling tickets and checking baggage. Most agents work in railroad freight stations. Some work in passenger stations.	Station agents usually rise through the ranks of other railroad occupations, such as telephoners, telegraphers, tower operators, and clerks.	At major freight and passenger stations, the agents' duties are mainly administrative and supervisory. Most station agents are union members.
Telegraphers, Telephoners, and Tower Operators	Following instructions given by dispatchers and yardmasters, tower operators route train traffic by working controls that activate signals and switches on the tracks. Telegraphers and telephoners receive orders about the train's movement, such as its speed or its route, and pass them on to the train crews. Tower operators work in towers located in railroad yards or at major junctions near cities. Telegraphers and telephoners work in yards and at railroad stations.	Telegraphers, telephoners, and tower operators should be responsible and alert, as they have to make quick decisions. Good hearing and eyesight, including normal color vision, are required. Jobs usually are filled from the ranks of clerical workers by seniority. Newcomers receive on-the-job training that covers operating rules, train orders, and station operations. Trainees must pass exams and demonstrate abilities before they qualify. Until permanent positions become available, newly qualified workers substitute for experienced workers who are absent.	Most telegraphers, telephoners, and tower operators are union members.
Track Workers	Railroads employ these workers to service, repair, and replace sections of track.	Railroads prefer applicants who can read, write, and do heavy work. The job is active and strenuous. A physical examination may be necessary. Most new track workers learn their skills through training on the job, which lasts about 2 years.	Track workers on traveling crews may have to commute long distances to work. Many live in camp cars or trailers provided by the railroads. Most track workers are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
MERCHANT MARINE OCCUPATIONS			
Merchant Marine Officers	In command of every oceangoing vessel is the captain, who has complete authority and responsibility for the ship. A typical crew on a ship is divided into the deck department, the engine department, and the steward's department. Deck officers direct the movement of the ship and the maintenance of the deck and hull. Engine officers are responsible for starting, stopping, and controlling the speed of the main engines, as well as maintaining the machinery and equipment aboard ship. Steward officers supervise the cooking and serving of meals, and the upkeep of living quarters. Officers work aboard dry-cargo ships, tankers, barges, ferries, freighters, passenger liners, and excursion steamers.	No educational requirements have been set for merchant marine officers. However, because of the complex machinery and navigational and electronic equipment on modern ships, formal training usually is needed to pass Coast Guard examinations. Candidates must meet certain legal (age, citizenship) and medical requirements. For example, they must be at least 21 years old, U.S. citizens, and have a health certificate proving good physical condition. They also must have at least 3 years of appropriate sea experience or be a graduate of an approved training program. Formal training for merchant marine officers is available at the U.S. Merchant Marine Academy in Kings Point, N.Y., and in six State merchant marine academies. These 4-year programs in nautical science or marine engineering provide classroom instruction as well as practical experience at sea.	Officers must be able to live and work in close quarters as part of a team. They are away from home for long periods of time. Generally, officers at sea work 7 days a week with two 4-hour shifts every 24 hours and 8 hours off in between. Overtime pay is received for over 40 hours work per week. Vacations range from 90 to 180 days a year. Almost 90 percent of all officers belong to maritime unions.
Merchant Marine Sailors	Sailors may be assigned to either the deck department, the engine department, or the steward's department. Under orders from their officers, they do most of the manual labor in these departments. Sailors work aboard dry-cargo ships, tankers, barges, ferries, freighters, passenger liners, and excursion steamers.	Although not required, sea experience in the Navy or Coast Guard provides a good background for merchant marine jobs. Applicants must get a health certificate from a doctor and then must obtain a letter from a shipping company stating that they will be hired when a job becomes available. In addition, applicants must register with the U.S. Coast Guard and acquire identification papers. All these requirements do not guarantee a job; they merely qualify you. To get a job, you must be present at a hiring hall when an opening becomes available. Hiring halls are located in the chief ports around the country.	Sailors must be able to live and work in close quarters as part of a team. They are away from home for long periods of time. Generally, sailors are required to work 7 days a week, with two 4-hour shifts every 24 hours and 8 hours off in between. Overtime pay is received for over 40 hours per week. Vacations range from 90 to 180 days a year. Most sailors belong to unions.

Transportation Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
DRIVING OCCUPATIONS			
Intercity Busdrivers	These workers drive passengers between communities and cities. They also inspect buses before leaving, collect fares or tickets from passengers, and load and unload baggage. Most work out of large cities.	Since they represent their companies in dealing with passengers, bus drivers must be courteous and tactful. They should have steady nerves and a relaxed personality, as heavy traffic can be a strain. The U.S. Department of Transportation requires that intercity drivers be at least 21 years old and be able to read, write, and speak English. They also must have good hearing and vision and normal use of arms and legs. Applicants must pass a driving test and a written exam that tests their knowledge of State traffic regulations. Most States require drivers to have a chauffeur's license. Many private bus companies prefer applicants to be at least 25 years old; some require bus or truck driving experience. Most companies conduct 2- to 8-week training programs for new drivers that include both classroom and driving instruction. Until permanent positions become available, new drivers substitute for experienced drivers who are absent.	Since intercity buses run at all hours, drivers may have to work nights or weekends. The job may require time away from home. Most of these drivers are union members.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Long-Distance Truckdrivers	These workers travel along turnpikes and highways carrying goods between cities that are hundreds or even thousands of miles apart.	The U.S. Department of Transportation requires that long-distance drivers be at least 21 years old and in good physical condition, including good hearing and vision, normal use of arms and legs, and normal blood pressure. Applicants must pass written and driving examinations. Most States require truckdrivers to have a chauffeur's license. Some companies require truckdrivers to be at least 25 years old and have several years of truckdriving experience. New drivers are usually trained on the job under the supervision of an instructor or an experienced driver.	A workweek of more than 40 hours is very common. This may include nights or weekends, and often time away from home. The noise and vibration of the truck, and being on the road for long periods of time, may be physically straining and tiring. Most long-distance drivers are union members.
Parking Attendants	Parking attendants park customers' cars and collect payment. They work in public and private parking lots throughout the country.	Attendants must have a valid driver's license, be able to drive all types of cars, and have good eyesight and peripheral vision. They also must be able to keep records of claim tickets, compute parking charges, and make change. Parking attendants should be neat, tactful, and courteous when they are dealing with the public. Good physical condition is helpful, because attendants may have to stand for long periods of time or move cars in a hurry. Although there are no specific educational requirements for parking attendants, many employers prefer high school graduates. Most attendants are trained on the job, under the supervision of a more experienced worker.	Attendants often work long hours and on nights and weekends. In addition, many attendants spend much time outdoors in all kinds of weather. A number of parking attendants are union members.

Transportation Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Local Transit Busdrivers	These workers drive passengers over city and suburban streets following specific routes and timetables. They also inspect buses before leaving, collect fares or tickets, and answer passengers' questions. They work in cities and towns throughout the country.	Busdrivers must be courteous and tactful in dealing with passengers. They should have steady nerves and a relaxed personality, as heavy traffic can be a strain. New drivers should be at least 21 years old, be in good health, and have good eyesight. They must pass physical and written exams. Most States require a chauffeur's license. High school graduates may be preferred. Most companies conduct on-the-job training for new drivers that includes classroom and driving instruction. Until permanent positions become available, new drivers substitute for experienced drivers who are absent.	The workweek for regular drivers usually consists of any 5 workdays during the week; Saturday and Sunday are counted as regular workdays. Some drivers work a split shift in which they work in the morning, have the afternoon free, and go back to work in the evenings. Most of these drivers are union members.
Local Truckdrivers	These workers drive around town, moving goods from warehouses and terminals to factories, stores, and homes. They often load and unload goods.	Qualifications for drivers vary, depending on the type of truck and nature of the business. Most States require a chauffeur's license. Applicants should be in good health, including good vision and hearing. Experience in loading and unloading freight or as a truckdriver's helper is useful. Since drivers often deal directly with the company's customers, the ability to get along well with people is important. Training given to new drivers is usually informal and may be only a few hours of instruction from an experienced driver.	Local truckdrivers frequently work over 40 hours per week. Night or early morning work is sometimes necessary. Many truckdrivers are union members.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Taxicab Drivers	Taxicab drivers pick up passengers at any location and drive them to their destination. Although taxicab drivers are employed in all but the smallest cities, employment is concentrated in large metropolitan areas.	Taxi drivers usually must have a State chauffeur's license and a taxicab operator's license issued by the local police or Public Utilities Commission. In most communities, applicants must pass a written exam on taxicab and traffic regulations. Many companies hire only applicants who are over 21 years old. Although there are no minimum educational requirements, many companies prefer applicants who have at least an eighth grade education. Applicants generally must be in good health and have a good driving record. Tact and courtesy are important in dealing with the public. A relaxed personality is also important.	Drivers may have to work nights or weekends. Many cab driving jobs are available for college students and others who want part-time work. Many cab drivers in large cities belong to unions.

Answers to Related Occupations

AIR TRAFFIC CONTROLLER

1. Airplane mechanic, 2. Airplane maintenance crew, 3. Baggage handler, 4. Co-pilot, 5. Dispatcher, 6. Electronics technician, 7. En route traffic controller, 8. Flight attendant, 9. Flight engineer, 10. Passenger agent, 11. Pilot, 12. Reservation agent, 13. Ticket agent.

RAILROAD PASSENGER CONDUCTOR

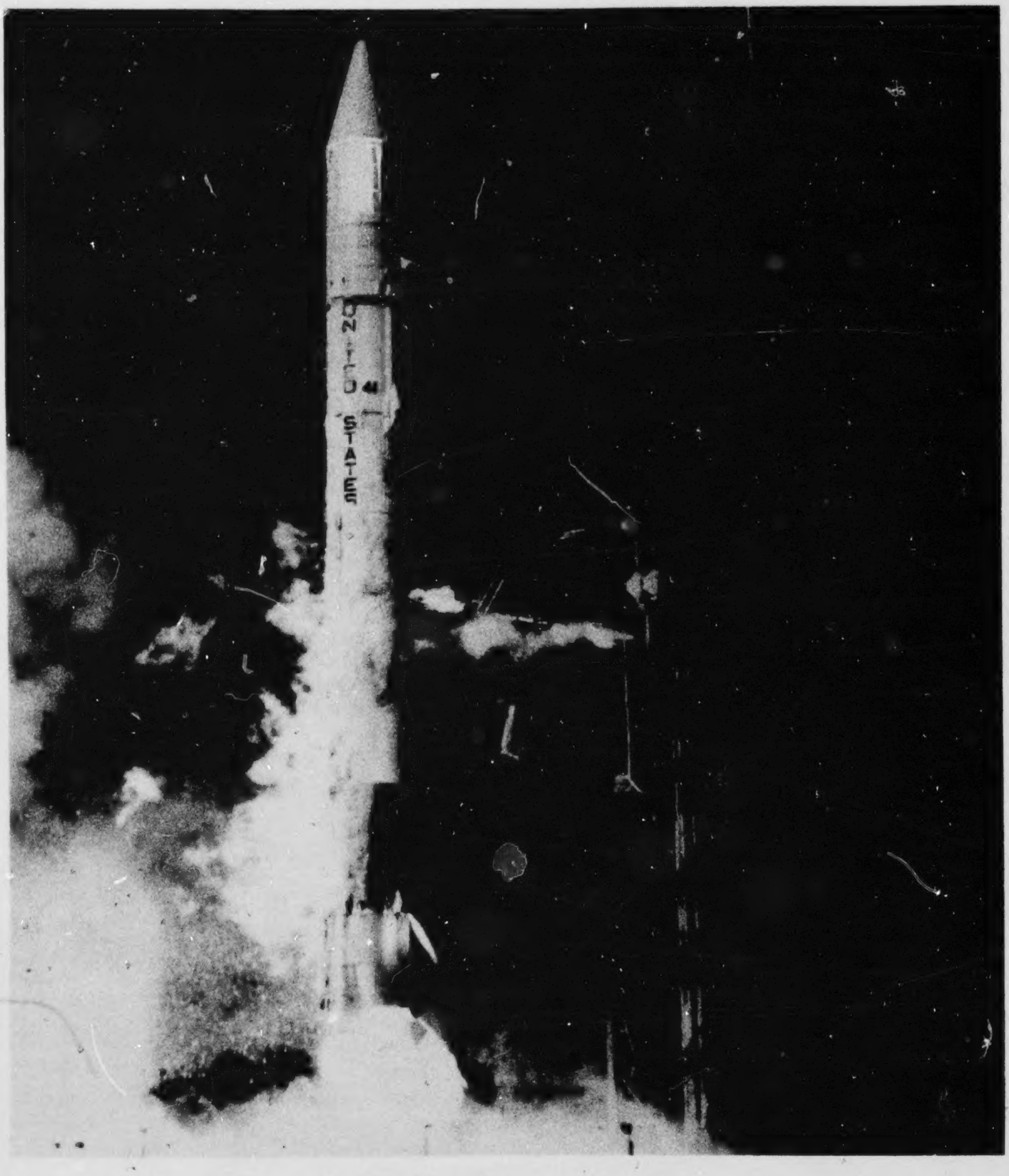
E	L	E	C	T	R	I	C	A	L	W	O	R	K	E	R	S						
			S	R	E	K	A	M	R	E	L	I	O	B								B
						B	R	A	K	E	O	P	E	R	A	T	O	R			D	L
							R			S	T	S	I	N	I	H	C	A	M		I	A
R	E	E	N	I	G	N	E														S	C
T	E	L	E	G	R	A	P	H	E	R	S										P	K
S	T	A	T	I	O	N	A	G	E	N	T	S									A	S
			S	R	E	N	I	A	T	N	I	A	M	L	A	N	G	I	S		T	M
			T	O	W	E	R	W	O	R	K	E	R	S							C	I
							E														H	T
						T	R	A	C	K	W	O	R	K	E	R	S				E	H
							S	I	G	N	A	L	I	N	S	T	A	L	L	E	R	S
	S	H	E	E	T	M	E	T	A	L	W	O	R	K	E	R	S					

BUS DRIVER

1. d, 2. f, 3. a, 4. h, 5. e, 6. b, 7. g, 8. c.

Exploring Careers

Scientific and Technical Occupations



Once in orbit, the Comstar D-3 satellite will be used for long-distance telephone service.

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Exploring Careers

Have you ever gazed at the stars on a clear night and wondered what's out there? Have you asked yourself what causes volcanic eruptions, earthquakes, or tidal waves? Or wondered why some mothers have twins or triplets? Perhaps you've never thought about these particular things. Undoubtedly, though, something in the world around you has made you stop and search for an explanation. This experience of yours is shared by humans throughout history, from the cave dwellers to your parents and friends.

People have always wanted to understand the universe. Out of this desire has grown the work of scientists, engineers, and technicians. The scientist gathers knowledge, which the engineer applies to practical problems in agriculture, health, energy, transportation, communication, and other fields. Technicians assist scientists and engineers in their work. Let's look at each a little more closely.

Scientists Investigate the Unknown

Scientists study the universe around us to learn why it behaves as it does. They investigate every aspect of our natural surroundings, from the center of the earth to the farthest star. They study things as small as the tiniest nuclear particle and as gigantic as a galaxy. Scientists examine bursts of energy lasting a millionth of a second as well as rock patterns formed over millions of years. Plants, animals, the oceans, the atmosphere all fall under the questioning eyes of scientists.

All scientists gather knowledge through *research*. To understand how, let's pretend you are a scientist trying to solve a problem. How would you go about it? That depends on the kind of problem you have. If you are a biochemist seeking a cure for cancer, you might examine the effects of certain drugs on rats or guinea pigs in a laboratory. But if you are a geologist studying the formation of a mountain range, you might spend much of your time outdoors collecting rock specimens.

No matter what problem you set out to solve, your research will follow certain guidelines. The first step is to learn what is already known about your problem. Your work depends on the work of scientists before you just as each brick of a building rests upon those below it. Without background preparation, you would spend all your time "reinventing the wheel" and have none left for new discoveries.

Once you have learned all you can from others' work, you consider how to solve the problem facing you. Often, the solution will involve some sort of *experiment*. You have probably performed some already. If so, you know that experiments must obey certain rules to be considered reliable.

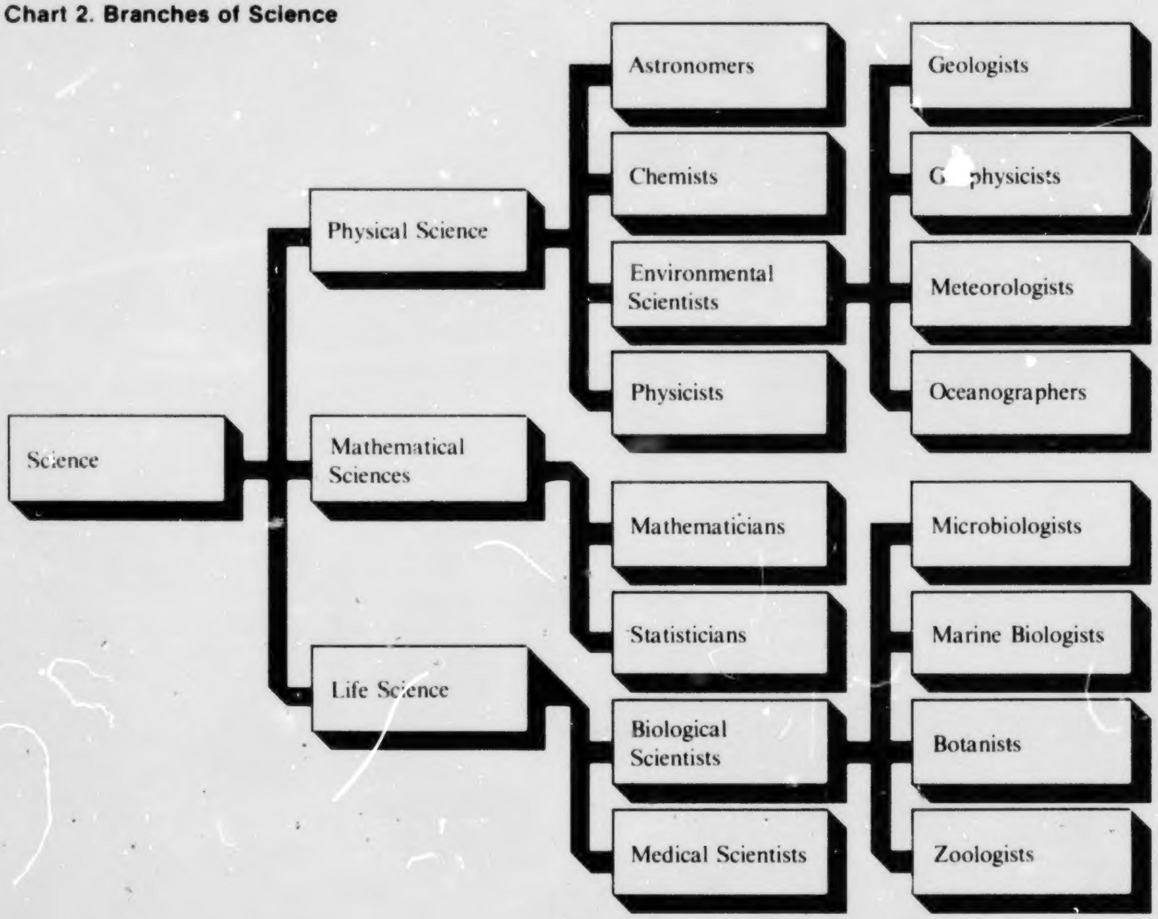
Let's assume that you are the world's leading botanist (plant biologist) and want to determine the best growing conditions for geraniums. If you want to study the effect of water alone, you must keep all other growing conditions—soil, temperature, and light—the same. Otherwise, if a plant grows poorly, how will you know whether it has received too little water or too little of something else? You can use many plants—let's say a hundred of equal size, planted in identical pots and soil. If you grow them in the same place under a fluorescent light, they will all receive the same amount of light and heat. You can group the hundred into tens, giving each group a different daily ration of water. Each geranium in group 1, for example, will receive one tablespoon a day; in group 2, five a day, and so on. Then you watch the plants' progress. As a good scientist, you keep a record of everything you do in the experiment, so that you and others may study it later. You want to measure and record the plants' growth every few days, because you may find the information useful. After several months' growth, you can begin to draw conclusions from your observations. If you find that one group of plants grew fastest during the first weeks, while another group grew fastest during the later weeks, you might conclude that the best amont of water depends upon a plant's size. Perhaps another experiment would tell you more precisely how much water the geranium needs.

You trust your conclusions because you followed rules of experimentation that all good scientists follow:

- Isolating one item to study (in this case, the effect of water on the plant's growth);
- Setting up the experiment to examine only that item;
- Recording your procedure and observations; and, finally,
- Basing your conclusions on evidence from the experiment.

Scientists use the information they gather from experiments to either confirm or deny the *hypothesis* they started out with. A hypothesis is an unproven guess about the results of a particular experiment. A hypothesis that is general enough becomes a theory. Theories are accepted explanations of what is known, but often a new theory will replace an old one as scientists investigate further. Astronomers long believed, for example, that the sun, planets, and stars all revolved around the earth. They constructed elaborate models to explain the movements they saw in the night sky. As new movements were observed, these models became more and more complex. Finally, a Polish astronomer named Copernicus stated a theory that the earth and other planets move around the sun, and the earth turns on its axis. Because it was simpler and more logical, Copernicus' theory

Chart 2. Branches of Science


Science
Physical Science
Mathematical Sciences
Life Science
Astronomers
Chemists
Environmental Scientists
Physicists
Mathematicians
Statisticians
Biological Scientists
Medical Scientists
Geologists
Geophysicists
Meteorologists
Oceanographers
Microbiologists
Marine Biologists
Botanists
Zoologists

eventually replaced the old theory as the foundation of astronomy.

What Makes a Good Scientist?

We see that scientists investigate the universe by learning what others already know, performing experiments, and constructing theories that explain the unknown. But what kind of person makes a good scientist? A list of the most important characteristics includes these:

Orderly Thinking. Scientists must be able to analyze problems and information logically in order to draw correct conclusions.

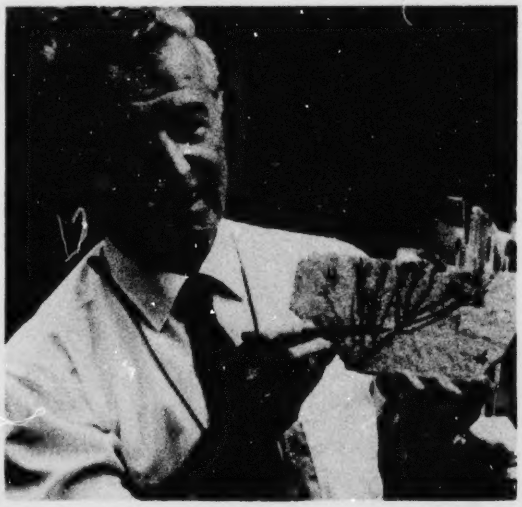
Systematic Work Habits. As we saw, scientists must perform experiments according to certain rules. To do so, they must work carefully and methodically.

The Ability to Work Alone or as Part of a Team. Most scientists work with technicians and other scientists. Cooperation is crucial. At the same time, scientists often work without supervision.

Patience. Some research (such as cancer research) can continue for years without results. A scientist must be able to keep searching for answers, despite occasional frustration.

Above all, *Curiosity.* Scientists have an unquenchable thirst for knowledge, an undying desire to understand the unknown. This intense curiosity inspires them to devote their lives to solving scientific problems, often without the reward of knowing how their discoveries will be used. Many of their achievements do not become important until long after their death. But those scientists continue to explore anyway, driven on by their curiosity.

Chemists must have patience and the ability to concentrate on detail. Experiments may take months to complete.



This botanist specializes in studying prehistoric plants.

Careers in Science

If you choose a career in science, what will you study? Take your pick from the whole universe. As you can see from chart 2, the numerous branches of science all grow out of three basic fields. (See p. 301.)

People in the *life sciences*, the first field, investigate living things. *Biological scientists*, or biologists, want to know how life on earth began, how plants and animals function, and how they reproduce. Biologists usually specialize in a particular group of living things. *Zoologists*, for example, study the animal kingdom, while botanists investigate the plant world. *Marine biologists* examine the living world of the oceans, while *microbiologists* study bacteria, viruses, and countless other organisms around us that we can see only with a microscope.

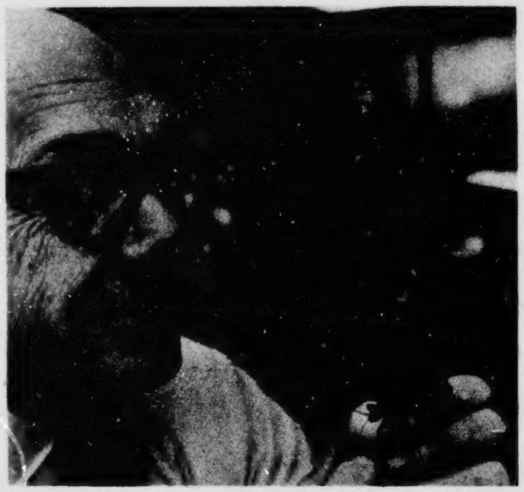
What biologists learn about living things, *medical scientists* use to understand and control diseases. Medical scientists differ from doctors (or physicians) who normally come to mind when we think of medicine. Medical scientists seek cures for diseases through research in laboratories, while physicians work directly with sick people. The work of physicians is described in the chapter on health occupations.

The *physical sciences*, the second basic field, cover the rest of our physical universe. Here we find *physicists*, who investigate the behavior of light, heat, electricity, magnetism, and gravity. They see how objects behave at very high speeds or very low temperatures. Past research in physics has provided the knowledge needed for such accomplishments as radio and television, nuclear energy, refrigeration, and space travel.

We also find *chemists*, one of the largest science occupations. Chemists study the 103 known elements (and occasionally discover new ones). They examine how these elements combine to form every substance in the universe, what properties they have, and how they react to one another. For example, chlorine and hydrogen, two gases, combine to form hydrochloric acid, a clear liquid that can burn your skin. The same chlorine, however, will combine with sodium to form ordinary table salt. A chemist would want to know how and why chlorine forms two substances with such different characteristics.

Astronomers, the smallest group of physical scientists, study the heavens with telescopes, cameras, and other devices in order to answer age-old questions about the universe: How large is the universe? How were the stars and planets formed? How do they move? What are they made of? And, perhaps most exciting of all, is there intelligent life elsewhere in the universe?

While astronomers look to the stars, *environmental scientists* examine the earth. *Geologists* study the history and composition of our planet. They also examine movements such as earthquakes and volcanic eruptions. *Geophysicists* turn their attention toward the interior of the earth, the movement of the continents, and the earth's magnetic and gravitational fields. *Oceanographers* focus on the oceans, their movements, and the land beneath the oceans, while the atmosphere and the weather are

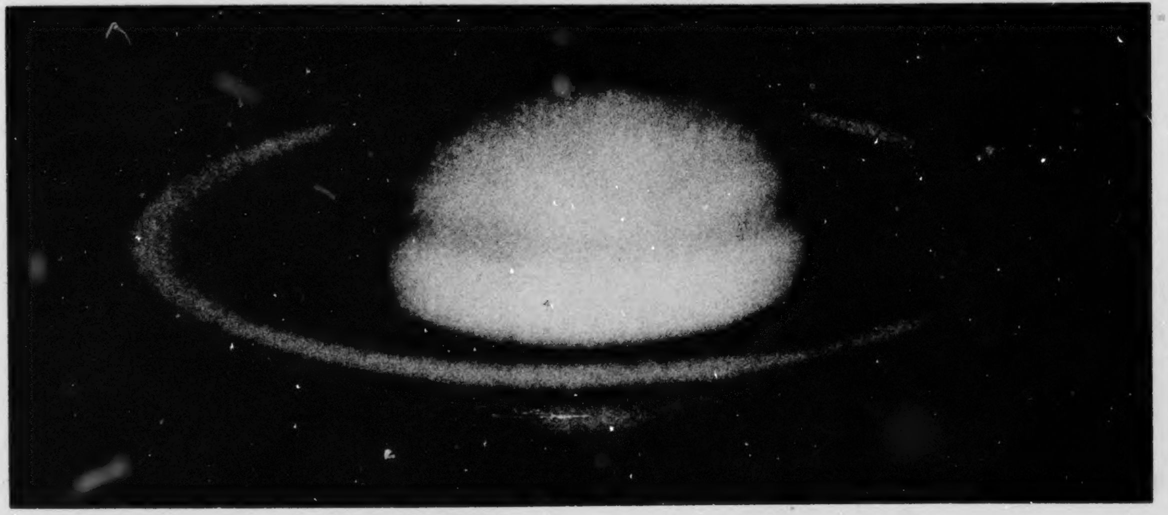


Entomologists develop ways to encourage the spread of helpful insects and the control of harmful insects.

Geologists study the earth's crust. Their research can help locate oil and other valuable minerals.

the domain of *meteorologists*.

Biological and physical scientists could not have achieved as much as they have without discoveries in the third field, the *mathematical sciences*. In addition to being a science in its own right, mathematics is the language of other sciences. *Mathematicians* study this science of abstract numbers. Most mathematicians develop their theories to solve a specific problem. Many, however, produce theories that find practical use only much later. *Statisticians* develop and use theories that allow scientists to make generalizations about a group of people or objects without studying every member of the group.



Astronomers took this picture of Saturn through a telescope. Careers in science are for people who like to explore the unknown.

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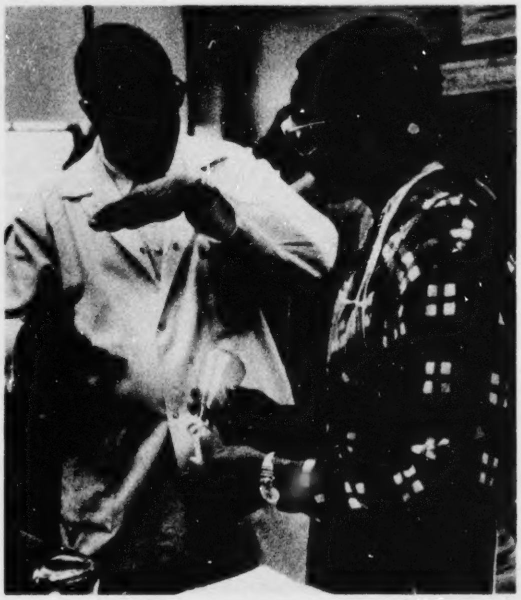
Exploring Careers

We have not named every kind of scientist. There are many more. Some, such as biochemists and astrophysicists, do research in overlapping branches of science. A few scientists move forward in totally new areas of science. . . . This is what an engineer named Karl Jansky did. He discovered that stars give off invisible waves just like the ones carrying music and news to our radios. Other scientists knew about these radio signals from the stars, but nobody paid them much attention. Jansky listened to them with a very sensitive "radio telescope." In this way he began the science of radio astronomy. Progress in science depends upon the pioneers who, like Jansky, break down the old barriers of knowledge and venture forth into unexplored territory.



Many chemists teach in universities.

Engineers Put Science to Work

Did you ever stop to think how many plastic items you use every day? At school you use plastic pens and rulers. You may sit at a desk with a plastic top. In the cafeteria you eat from plastic plates and trays. Perhaps the plates and cups in your kitchen at home are plastic, too. You talk on plastic telephones, listen to plastic records, and use plastic sports equipment. Look around, and see if you can count the number of plastic items in the room you're in right now.

Plastics are just one result of the work of engineers. Others include radio and television, automobiles and airplanes, bridges and skyscrapers, ships and submarines, anything electrical . . . the list goes on and on. Engineers produced all these things by applying scientific knowledge to everyday problems. In fact, most of the discoveries of modern science would have remained laboratory curiosities if not for engineers.

To do their jobs well, engineers must be creative.

What Do Engineers Do?

Engineers begin with a "how to" problem—how to build a bridge, how to increase the output of a factory, or how to turn sunlight into electricity. Like scientists, they do research to find a solution. In designing a supersonic airplane, for example, aeronautical engineers test different airplane shapes in a wind tunnel to see how they behave at high speeds. Such tests help them decide on the best design before actually building the plane. Similarly, civil engineers make models of various bridges to test each design for strength.

Through research, engineers find scientific answers to the "how to" problem. But finding a solution that works is only the beginning. Engineers also must figure out the cost and difficulty of using that solution. Imagine you are a civil engineer designing a subway tunnel for a large

Engineering careers are for people who like to solve problems.

city. You have designed a tunnel that you think would work very well. But you would not have solved the city's problem if your tunnel would cost twice what the city could afford, or if large buildings had to be moved to build it. You have to make sure that your solution to the problem is *economical* and *practical* as well as technically correct.

How do engineers solve problems? They use tools of various kinds, the most important being analytical tools. Analytical tools permit engineers to reshape their problems into manageable forms, and this helps in the search for a solution. Mathematical models are one such analytical tool. The model that an engineer builds is nothing more than a set of equations that describes the problem mathematically. By building a model, an engineer can examine the effects of changes in different parts of the final product.

Engineers also employ equipment of all shapes and sizes for measuring, calculating, and testing. Some devices, such as wind tunnels, serve a very specialized purpose. Others, such as calculators and oscilloscopes, you would find in the laboratories of many kinds of engineers. Some tools remain in the lab; others are used outside, "in the field."

The computer is very important. It can perform calculations that are too long or involved to do by hand. It can handle hundreds of equations at once, so that the engineer can build larger, more complex mathematical models. It can also be used to actually help design whatever the engineer is trying to create.

Engineers rely on one other important tool: Creativity. Unlike math, creativity can't be taught. But good engineers have it and use it to apply science in new, slightly different ways. Although engineers rely heavily on the work of others (such as scientists), they constantly face problems requiring original solutions. They discover, explore, invent, and devise. To do their job well, they must be creative.

Careers in Engineering

If you decide on a career in engineering, you can choose from a wide variety of fields. They are as diverse as the needs of society. Some types of engineers specialize in a particular industry. *Agricultural engineers,* for example, develop ways to produce, process, and distribute food more efficiently. They might design new harvesting equipment or a better canning process. *Chemical engineers* create plastics, synthetic fabrics, and other new materials through chemical processes. *Mining engineers* locate minerals in the ground, design mines, and make sure they operate safely. They also devise ways to transport the minerals to processing plants. *Petroleum engineers* perform a similar role for oil and gas products.

Other engineers specialize in a particular type of technology. *Mechanical engineers,* one of the largest groups, design and develop machines that produce or use power. Every day we rely on such machines—cars and trucks, refrigerators and TV sets, heaters, air conditioners, factory machines, and countless others. Mechanical engineers help create and produce all these machines as well as gasoline engines, steam turbines, jet engines, and nuclear reactors. Some mechanical engineers specialize by concentrating on a single type of machine (such as a jet engine) while others specialize in a single industry (such as the automobile industry).

Electrical engineers, another large group, design and develop electrical and electronic devices. Anything that uses electricity is electrical. Electronic machines—such as radios, TV's, telephones, and computers—convert electricity into sound, radio waves, or some other form of energy. Like mechanical engineers, electrical engineers work in many different industries and usually specialize in a particular area.

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Astronaut Guion S. Bluford, Jr., has a doctoral degree in aerospace engineering.

By studying collisions in the lab, engineers and scientists can design safer automobiles.

The world of flight is the world of *aerospace engineers.* They deal with every aspect of aircraft and spacecraft performance, from planning and design to production, testing, and actual use. *Biomedical engineers* use their engineering skills to improve health care in many ways, such as by designing artificial organs or by adapting computers for use in hospitals. *Ceramic engineers* design and develop products from ceramic materials, which are nonmetallic substances processed at high temperatures, such as glass or porcelain. *Metallurgical engineers* cover the broad technology of metals—understanding their properties, extracting them from the earth, refining them, and converting them into finished products.

Other engineers work in construction and a wide variety of industrial activities. *Civil engineers* design large facilities such as highways, railroads, bridges, airports, and water and sewage systems. *Industrial engineers* are "the manager's engineers." They look for ways to make factories and other business operations run more smoothly and efficiently.

We have mentioned only the major categories of engineering. We could not possibly describe each individual specialty. Not only are new ones created all the time, but every engineer's craft is slightly different, depending upon his or her particular training and job. Within the few engineering occupations mentioned there are hundreds of specialties.

Technicians Perform the Practical

We have said that scientists and engineers work as part of a team. Who are the other members of the team? Many are technicians.

But what is a technician? The word (along with the words *technical, technology,* and *technique*) comes from a Greek word meaning *skillful* or *practical.* And there you have the key: Technicians perform the practical aspects of a job, leaving theory to the scientists and design to the engineers. They are the "doers."

Technicians perform the day-to-day tasks necessary in creating a new project or running an operation. They operate testing and measuring equipment in a laboratory. They make drawings of new designs. They build physical models of new projects. They estimate the cost of a project and the amount of materials and labor needed to complete it. They inspect a manufacturing plant to see that the product's quality stays high. They repair machines that break down. They may act as sales representatives, selling products like airplanes or computers.

What Makes a Good Technician?

Evey branch of science and engineering has its technicians. Just listing their titles would take several pages. All of them have certain qualities in common:

Basic Background. Technicians have a good foundation in math and the basic sciences—physics, chemistry and/or biology. But they learn more practical problem-solving and much less theory than a scientist or engineer.

A "Head" for the Practical. Many technicians use theoretical knowledge in their work, but most of what they do is of a nuts-and-bolts nature.

Patient, Systematic, Precise Work Habits. Often a technician must repeat a test many times in exactly the same way, or perform a task within very narrow standards. These require reliable work habits.

Ability to Work Under Pressure. In many kinds of work, if something important goes wrong, the technician must think and act quickly without panicking and without making mistakes.

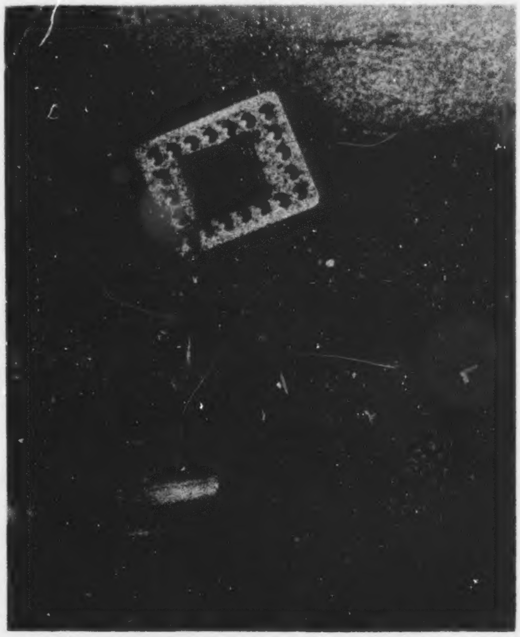
Good Hands. Technicians build, use, and repair equipment and do many other tasks that require them to be good with their hands.

Training for Scientific and Technical Occupations

How would you train for a career as a scientist, engineer, or technician? You may already have begun. If you have hobbies related to science or engineering you already are gaining valuable experience. Using a chemistry set, building radios, fixing bicycles—activities such as these teach skills that could be useful in science or engineering occupations. Do you like to go to museums to learn about the stars, the oceans, or natural history? You may already have begun your science education.

Formal training in science begins in high school. You should take as much math as possible, as well as basic science courses—biology, chemistry, physics, earth science. Your high school probably offers other classes, such as electronics and drafting, that would be useful in some career fields. English courses are important, too, since scientists, engineers, and technicians must be able to communicate clearly with their co-workers, both orally and in writing.

Most of your training, of course, would occur in college. Scientists and engineers generally earn a bachelor's degree after 4 or 5 years' study, and then go on to



Developed by electronics engineers, this tiny device made possible TV cameras no larger than a deck of cards.

A biomedical engineering experiment.

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Drafting can be a career for people who like to draw.

graduate school, if necessary. Today, most science occupations require a Ph.D. Fewer engineers than scientists need a doctorate. Most find work with a bachelor's or master's degree. For teaching or for advanced research, however, the Ph.D. is essential. Technicians usually spend 2 years in special technical training programs after high school, although some have 4-year degrees.

Training does not end when you earn a college degree. New discoveries occur so often that what you learn in college soon will become outdated—though not useless. Just as you can expect to learn new words your whole life, scientists, engineers, and technicians continue to learn new theories and applications their entire lives. They learn by reading books and magazines, going to conferences, and attending occasional seminars. Careers in science are for people who like to learn outside as well as in school.

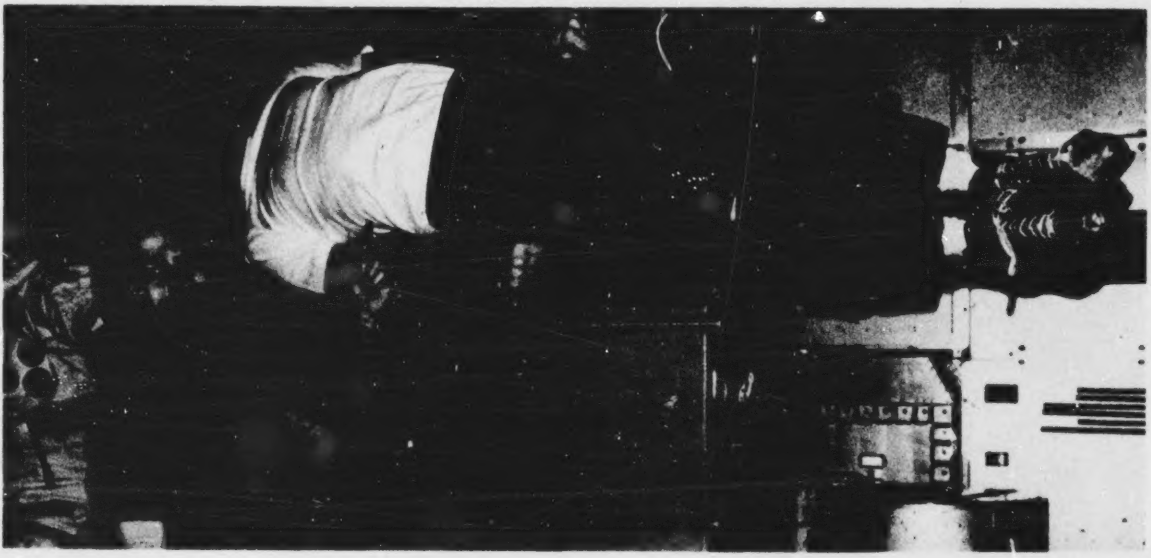
A Final Word

If you have a strong interest in science or mathematics, don't stop here! Several other chapters of *Exploring Careers* are worth looking into.

There is a chapter on Health Occupations, many of which require a sound grasp of biology and chemistry and the ability to draw on scientific principles in dealing with day-to-day health care.

Students who are good in mathematics or physics might want to learn more about a career in architecture. This field, like engineering, involves an understanding of materials and their properties. A story about an architect appears in the chapter on Performing Arts, Design, and Communications Occupations. A field closely related to both architecture and engineering is urban and

Technicians assist scientists and engineers. "Technician" comes from a Greek word meaning practical skill.



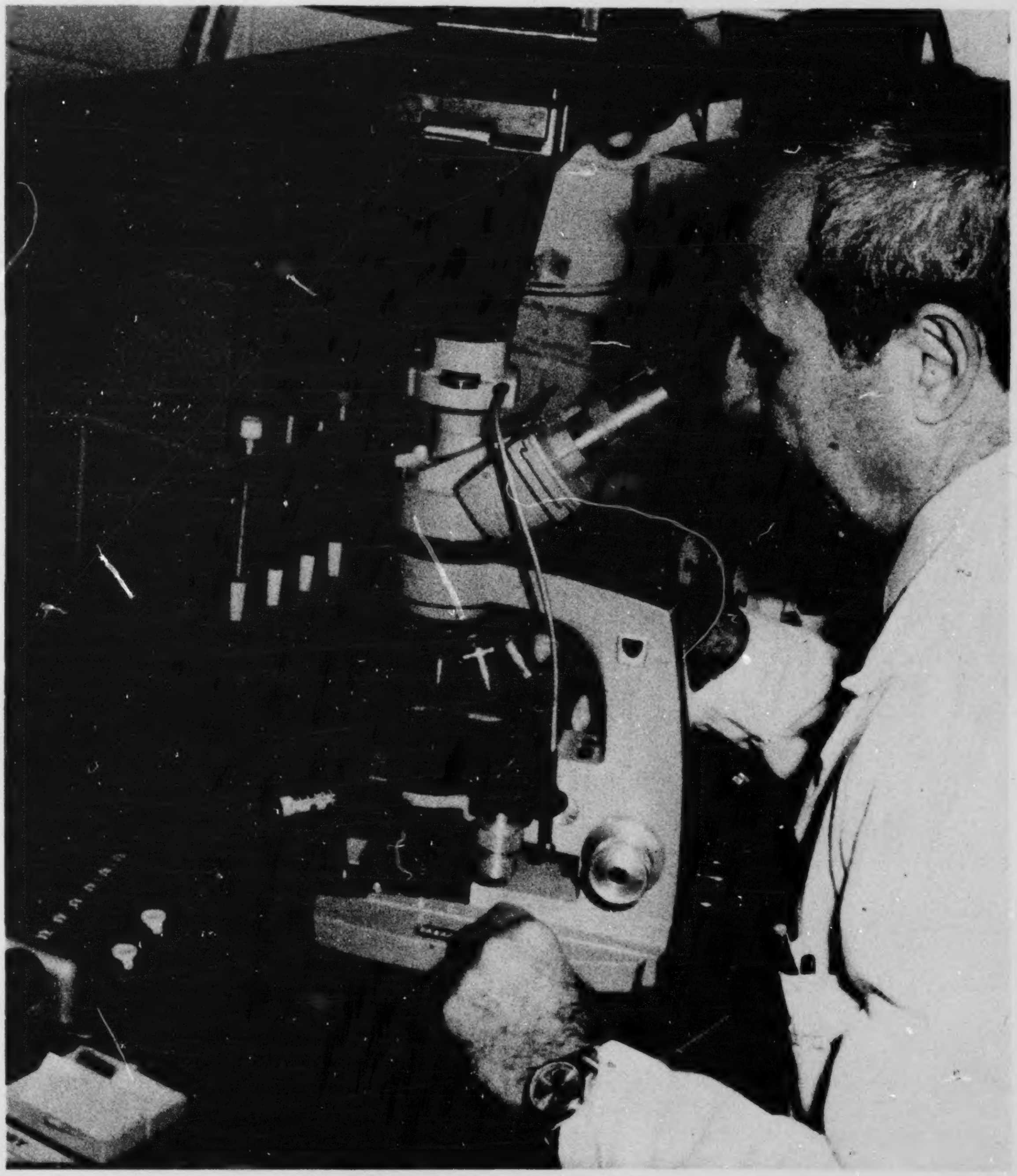
Astronauts demonstrate zeroing effects on weight.

regional planning. A story about a planner appears in the chapter on Office Occupations.

Interested in computers? You may already know of the broad range of scientific and technical jobs in the field of computer science, including programming, systems analysis, and computer design. To learn a little more about this field, read the story about the programmer/systems analyst. This, too, is in the chapter on Office Occupations.

Did you know that it takes more than an interest in the environment and the outdoors to become a forester? Scientific training is important, too. A story about a forester appears in the chapter on Agriculture, Forestry, and Fishery Occupations.

Biochemist



Dr. George Catravas' plans took several twists and turns before he decided on chemistry. "I didn't even like chemistry in high school," he recalls.

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Scientific and Technical Occupations

George Catravas works in a special world. He wears a white coat. He walks on concrete floors in large rooms with cluttered counters and cabinets. He works at tables covered with glassware, hardware, and plastic tubes. He handles mice and rats in cages. He uses large machines with long names like "analytical ultracentrifuge" and "recording spectrophotometer."

Most of us never see this world.

At the same time, he works in a world common to all of us. His is the world of the cell, the basic unit of life.

George Catravas is a biochemist.

As chairman of the biochemistry department at the Armed Forces Radiobiology Research Institute in Bethesda, Maryland, Dr. Catravas has many duties. He plans, supervises, and coordinates activities of the whole department. Now and then he teaches at a nearby university, which he enjoys.

But most of all he loves research. "Molecules don't cheat," he points out. "They remain the same, waiting for you to figure them out."

As the Institute's name suggests, Dr. Catravas studies radiation and its effects on humans and other animals. People receive doses of radiation from many sources. Every day we all absorb small amounts of natural radiation from outer space and from radioactive minerals, such as uranium, in the earth. Radiation also comes from X-ray machines, nuclear reactors, and other places where radioactive materials are used. "Radiation" actually means any of a whole variety of energy rays, including visible light, ultraviolet light (the kind made by sunlamps), heat, radio waves, and others. Most of these rays are harmless to living things. Many kinds, however, such as X-rays and gamma rays, can be dangerous. These dangerous rays are the ones studied at the Institute.

Radiation can cause cells to reproduce in a new form and become cancerous. Dr. Catravas and his colleagues want to know exactly how this occurs. The damage depends on the type of cell as well as the type and intensity of radiation. When they understand this process well enough, they will better understand how to protect people from harmful radiation and how to use radiation for beneficial purposes.

Dr. Catravas and his team of workers have several different projects in progress. He himself spends most of his time studying how radiation and certain drugs affect the cells of the brain. He also takes part in projects to answer other questions, such as how radiation affects liver cells, how it can be used to treat cancer, and how we can protect ourselves from it.

Before beginning an experiment, Dr. Catravas, like any good scientist, must plan. He and his assistants decide exactly what they hope to learn and how this experiment will give them their answer. They then discuss what they will need. What kind of animals should be used? How much radiation should they be exposed to and for how long? Must anything be done to the animals beforehand? When and what will they be fed?

Dr. Catravas explains all the details of the experiment to his laboratory technicians so that they can perform the necessary steps, with his help and guidance. He will perform especially delicate experiments first, while his assistants look on. But, being a teacher as well as a researcher, Dr. Catravas gives his helpers as much responsibility as possible so that they may learn by doing.

How does the actual experiment proceed? In studying the cells of the cerebral cortex of the brain, for example, Dr. Catravas may decide he needs only a few milligrams of brain tissue for each of three or four types of analysis he wants to perform. One mouse is enough to provide that amount. The Institute buys rats and mice from companies that breed them especially for laboratory purposes, and has its own veterinarian to keep them free of disease.

Dr. Catravas selects his mice at random for the experiment and feeds them. He places them in small cages that confine their movement, so that they will receive a uniform dose of radiation. He then puts the cages in a large chamber where they will be exposed to X-rays. He may decide to expose them for 90 minutes a day for 7 days, or for some other length of time.

Once he has exposed the mice, he has them dissected and their cerebral cortexes removed so that their cells can be examined. He uses biochemical techniques to separate the cells into their parts, in order to look at each. First he uses chemicals that break the membrane, or outer covering, of each cell. Then he puts the sample in a centrifuge, a machine that spins the sample at very high speeds, the way you might swing a ball in a circle on a length of string. The centrifugal force pulls the heaviest part of the cell, the nucleus, closest to the bottom of the tube, away from the center of the machine. Lighter parts of the cell migrate toward the middle of the tube, while many of the enzymes remain at the top. In this way the centrifuge creates layers in the tube, with each layer containing different parts of the cell. Using this and other sophisticated techniques, Dr. Catravas can separate the cells into their various parts.

Next, he examines the parts by using other instruments. One instrument, the electron microscope, allows him to view parts of the cell too small to be seen through normal microscopes. Another, called an analytical ultracentrifuge, photographs the cell molecules in ultraviolet light as they are spun to see if they are broken. These and other techniques allow Dr. Catravas to study the damage caused by the radiation.

An experiment may require several weeks to complete.

After it is finished, Dr. Catravas again meets with his co-workers, this time to discuss the results. Did the experiment run as planned, or should it be repeated? Should it be changed and rerun? Did a new factor appear that requires further study? What new experiments are needed? With each experiment the researchers come closer to the answers they seek.

How does one become a biochemist? Dr. Catravas' own path took several twists and turns. His background includes some training in law, as well as separate degrees in chemistry, biochemistry, and organic chemistry. He studied and taught in Greece, Germany, England, and France before coming to the United States to do further study and research at the University of Chicago. After 7 years there, he left to join a company that makes laboratory instruments. Several years and a few inventions later, he moved to his present position.

You needn't study in as many places nor take as many degrees as Dr. Catravas to find interesting work in biochemistry. Some of his assistants, for example, have bachelor's degrees, while others have master's degrees. They all learn on the job as well as in school. But Dr. Catravas points out that, to reach positions of responsibility in this field, you should have a Ph. D. degree. That may seem like a mountain of work, but it can also be a short beginning step in a long, satisfying career.

Just ask George Catravas.

Exploring

Biochemists are curious about the wonders and mysteries of life.

- Do you enjoy looking at ordinary living things, such as leaves, insects, and flowers, through a magnifying glass or microscope?
- Do you try to learn more about what you see?
- Do you wonder what your body, the earth, or the stars are made of?

Biochemists continue learning all their lives.

- Do you like to read?
- Do you look up words you don't know in a dictionary?
- Do you like to browse in the new book section of your library?
- Do you belong to a science club?

Biochemists must think like detectives to solve the mysteries of science.

- Do you like to solve puzzles, riddles, and brain teasers?
- When you don't understand something, do you try to figure it out before asking for help?

Biochemists work with numbers and advanced mathematics.

- Do you do well in math?
- Do you enjoy working with numbers?
- Do you like to calculate sports statistics or automobile mileage?

Biochemists do experiments that may take weeks, months, even years to finish. They must be very patient.

- Do you enjoy crafts such as paint-by-numbers or needlepoint?
- Do you like to do large jigsaw puzzles?
- Do you like long projects such as growing vegetables or putting on a play?

Biochemists pay attention to detail when they do research.

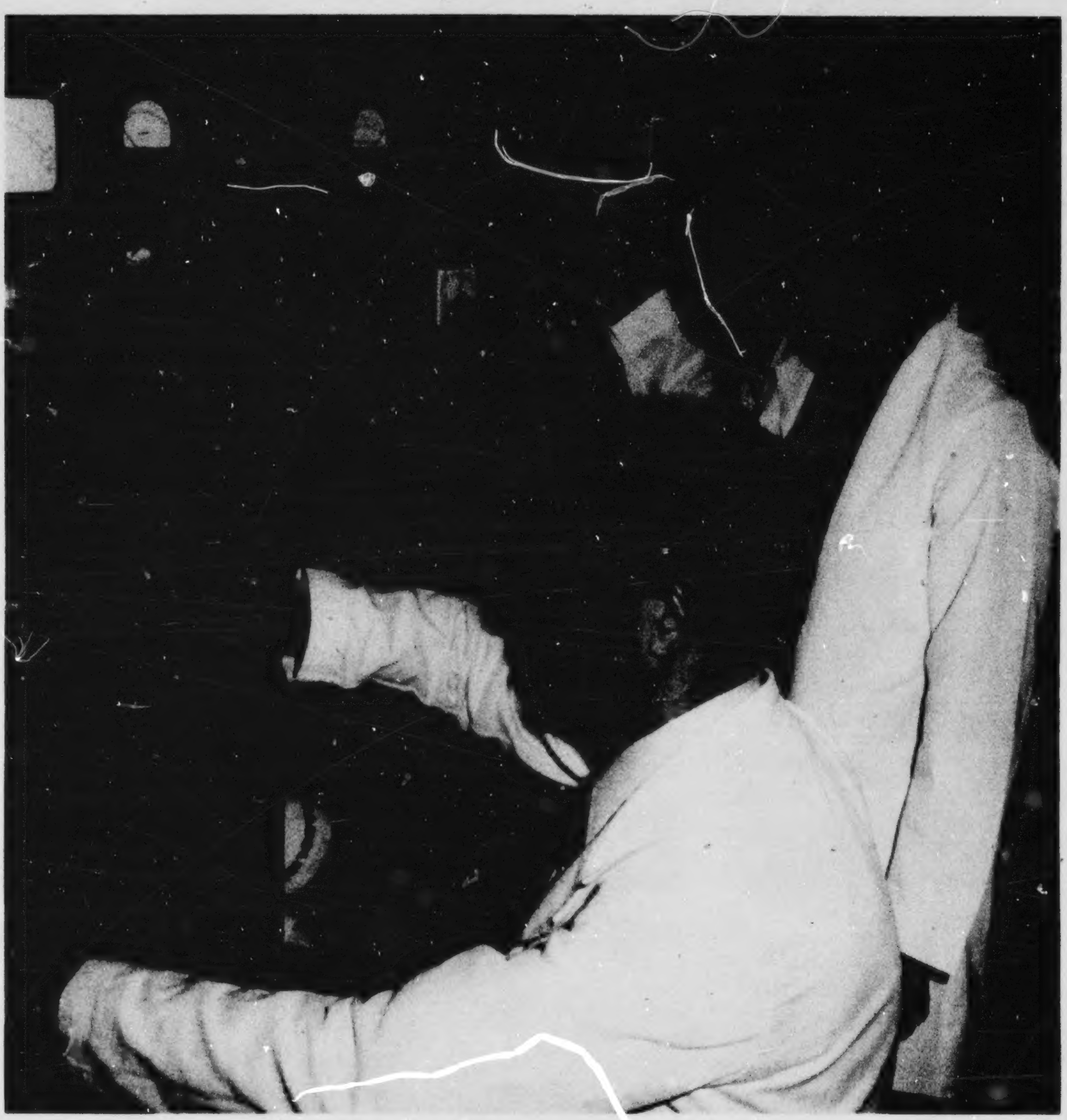
- Can you follow the instructions correctly when you build a model airplane, assemble a radio from a kit, make a casserole, sew clothes from a pattern, or put together a bicycle from parts?
- Can you give detailed instructions?
- Can you read a road map?

Suggested Activities

If you live near a chemical, pharmaceutical, or textile manufacturer, or some other company with a chemical research laboratory, arrange a tour of the lab for your class. Find out what kinds of experiments the scientists perform, what procedures they follow, and what equipment they use.

Prepare a report for your science class on one of the following topics:

- The periodic table of elements. As you read and explore, try to answer these questions: What is an element? How does it differ from a compound? What do the numbers in the table stand for? Why is the table arranged the way it is? (Hint: What do the elements in each column have in common?) Your science teacher and school librarian can suggest books that will help you answer these questions.



Dr. Catravas loves research. "Molecules don't cheat," he points out. "They remain the same, waiting for you to figure them out."

- The chemicals used in the human body. What elements does your body need to live? How does it take them in? What does it do with them? Make a chart to show how your body obtains and uses oxygen.
- Animal cells. Make a drawing of a typical animal cell, labeling all the major parts. What purpose does each part serve? How does an animal cell differ from a plant cell? What different kinds of cells are found in the human body?

Exploring Careers

Learn about life science on your own by trying these activities:

- Keep an aquarium or terrarium.
- Watch TV specials about wildlife, medicine, and other life science subjects.
- Check your library for articles of interest in *Science News*, *Scientific American*, and other science journals.
- Visit nature or wildlife centers in your area. Call the local department of parks and recreation to find these centers.

If you are a Boy Scout, try for merit badges in Botany, Zoology, Chemistry, and General Science.

If you are a Girl Scout, see if you local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Animal Kingdom, Plant Kingdom, and Science.

Join a Marine Science, Conservation, or Ecology Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Invite a biologist, chemist, or biochemist to speak to your class about his or her work. Prepare questions for the speaker in advance.

Report to your class on the different kinds of work performed by biologists and chemists. Draw a diagram to show the various branches of each science, describe the work of each branch, and point out where the two sciences overlap. One way to investigate is to write for career information to the American Society of Biological Chemists, 9650 Rockville Pike, Bethesda, Maryland 20014.

Related Occupations

Biochemists are not the only scientists who deal with living things. Several other kinds of scientists are listed below, along with possible descriptions of what they do. For each occupation, see if you can choose the correct description.

1. Agronomist

a. Improves the quality and yield of agricultural crops.
b. Studies the different species of spiders.
c. Performs research on agronomes, which are part of the nucleus of a cell.

2. Microbiologist

a. Develops new ways to use the microscope in biological research.
b. Breeds plants and animals in order to produce smaller varieties.
c. Studies the growth and characteristics of bacteria, viruses, and other microscopic organisms.

3. Pharmacologist

a. Investigates the effects on animals of drugs, poisons, and other substances.
b. Breeds new and better varieties of animals for food.
c. Decides what medicine each patient in a hospital should receive.

4. Pathologist

a. Studies the migration patterns of animals.
b. Investigates the effects of diseases, parasites, and insects on human cells, tissues, and organs.
c. Performs research on the relationship between mental disorders and criminal behavior.

5. Embryologist

a. Studies the causes and effects of genetic defects.
b. Investigates the development of an animal from fertilization through pregnancy.
c. Searches for a cure of cancer.

6. Organic Chemist

a. Creates new chemical substances from plants.
b. Analyzes the chemical processes that take place inside the kidney, liver, and other human organs.
c. Studies the structure and properties of compounds containing carbon.

7. Horticulturalist

a. Develops new and better methods of cultivating plants for orchards and gardens.
b. Studies the social structure of bee colonies.
c. Grows mold cultures in a laboratory in order to make penicillin.

See answers at end of chapter.

Electrical Engineer

As vice-president in charge of engineering, Gloria Blue uses her talents to develop new hi-fi products.

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Exploring Careers

Gloria Blue pulled into her parking space and turned off the engine. Climbing out of the car, she noticed how warm the morning was. Although she had moved to Los Angeles from Chicago over 6 years ago and should have been used to the weather by now, spring-like days in November still seemed odd.

Gloria entered the modern brick building with the sign above the double glass doors that read "Auto Fidelity Inc." After greeting the receptionist, she stopped to chat with another co-worker before climbing the stairs to her own office, the one marked "Vice-President of Engineering."

Laying her briefcase on the table, Gloria ran over the day's work in her mind. Normally Friday was the easiest workday, but there'd be plenty to do today before going home for the weekend.

Auto Fidelity Inc., known as AFI, is one of the nation's leading distributors of sound equipment for cars and other vehicles. AFI manufactures radios, tape players, speakers, and other products and distributes them to stores and dealers across the country. As Vice-President of Engineering, Gloria Blue uses her electrical engineering skills to develop new products that meet the needs of customers. She is the bridge between the technical side and the sales side of AFI's business.

Armed with a cup of coffee, she sat down to the first task of the day—completing a technical bulletin she had begun earlier in the week. Since many car owners install two pairs of speakers in their cars instead of just one, Gloria and her staff had designed a new connector plug that allows the customer to connect all four speakers to the radio without splicing wires. But AFI couldn't get its sales campaign underway until the sales staff understood what the new connector could do, and what advantages it offered. Gloria's bulletin would explain all this to the sales people.

She had nearly finished writing it when Bob Cohen, chief design engineer, called. "Come on down to the lab when you have a chance," he said. "I've finished the model of the equalizer."

"I'll be right down," answered Gloria, anxious to see Bob's results.

Bob was leaning over a table, changing a few details on a drawing, when Gloria walked into the room. "It's over here," said Bob, turning to one of the metal workbenches littered with electronic devices, handtools, wires, half-dismantled radios, and loose parts. He picked up a small metal box with several knobs on one side and handed it to his boss. Removing the top and examining the box closely, Gloria commented, "I think we have a winner."

The equalizer was one of her better ideas. She had followed trends in the home stereo equipment market as well as in the automobile products sold by AFI's competitors. From all she had seen, Gloria felt that the public would buy a combination power booster and equalizer. The booster would increase the loudness of a radio or tape player, while the equalizer would allow the listener to adjust the volume of the treble, middle, and bass tones individually, thus "equalizing" the sound. No other company offered such a product for automobiles.

After creating the general concept, Gloria had handed the idea to Bob and his staff, who actually designed the device. They figured out what parts to use, arranged them in a package, and tested it. But they worked under the guidance of Gloria, whose job it was to make sure the product would be attractive, reliable, and inexpensive.

Gloria and Bob, both electrical engineers, performed quite different engineering jobs at AFI. Bob's position was purely technical, while Gloria had moved into a management job. The work was a far cry from what she had dreamed about as a teenager.

When she was in junior high, Gloria was sure she'd be a nurse one day. Her favorite aunt was a head nurse at one of Chicago's largest hospitals, and Gloria enjoyed talking with her about the job. By her senior year in high school, she had changed her mind. A long talk with her guidance counselor encouraged her to think about a career that involved mathematics; Gloria always had made excellent grades in math. So she started college with plans to become a math teacher.

That fall she met her husband-to-be, Larry, who was a junior at the engineering school. They frequently studied together and discussed their courses. Gloria grew more and more interested in Larry's engineering problems, and liked trying her hand at solving them. Before the school year was over, Gloria had decided to switch to electrical engineering. It took all summer to sell her parents on the idea but they finally agreed that the decision was hers to make. Gloria recalls how proud they were when she received her bachelor's degree in engineering.

Gloria started out in the research and development division of a large manufacturer of electrical products in Chicago, and spent the next 10 years there. She developed a solid reputation in the area of product development. At the same time, she was attending evening classes in business and management to earn a master's degree in business administration. This combination of technical and nontechnical skills made her just the right person for the California job advertised by AFI.

Gloria and Bob discussed the equalizer for almost an hour. Once the company's designer developed the cosmetics, or outer appearance, for the product, the factory could begin producing it. Then, after testing, it would appear in the stores. Gloria looked forward to that day; of all the things she did for AFI, she most enjoyed seeing an idea grow into a successful product.

On her way back to her office, she bumped into Jim Leviton, the company president. "By the way, Jim," said Gloria, "I've looked at that new spectrum analyzer that California Instruments makes and read the literature on it. It can test a radio in about 2 seconds, much faster and better than we can now. And even though it costs $6,000, we need it badly for our laboratory."

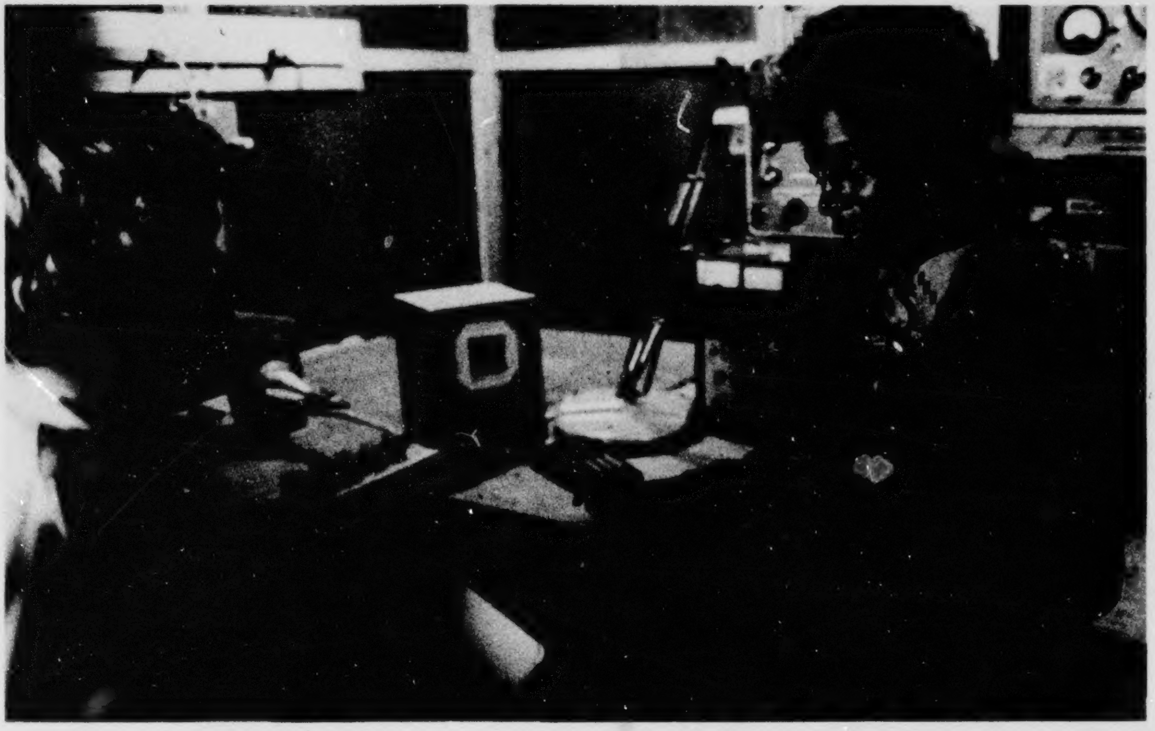
"Let's get together with Al and decide if we can afford it," answered Jim. "How about this afternoon?"

"Fine," replied Gloria, "as long as we don't talk too long. I'll have that sales bulletin on the connector done before lunch, but I still have some preparing to do for Monday's meeting with Toshiro."

"That meeting will be a long one," thought Gloria. Hero Toshiro is an engineer who works with the manufacturing division of AFI. Gloria gives him her ideas in the form of a drawing or, as with the equalizer, a model. He and his staff then complete the design and put it into production. Gloria was encouraging the development of thinner and thinner radio and cassette mechanisms for the new year. She felt that the latest trends were leading in that direction, and she hoped that Toshiro and his staff could develop them in time for the new product year. At their Monday meeting they would discuss problems and progress of the new design.

After the conversation with Jim, Gloria continued on her way back to her office. "You'd never know how much work I have by looking at my desk," she thought as she sat down. The desk top was large but fairly empty. Between the "In" box on one side and a stack of trade journals on the other lay the bulletin she was working on. Everything else was put away. Gloria felt that you couldn't get ahead unless you were organized. And she was proud of her talent for organization.

Gloria glanced at her watch. It was 11:30, and she had an appointment for lunch at noon. With quick strokes of her pen she continued writing, changing a word here and adding a sentence there until the bulletin was finished. Then, after checking the diagrams once more, she gave it to her secretary to be typed.



Gloria and Bob discuss plans for a new product. "A career in engineering has given me the opportunity to express myself creatively," says Gloria.

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Exploring Careers

Exploring

Electrical engineers must deal with complex devices and understand how they work.

- Do you enjoy taking things apart to see how they work?
- Do you like to repair your bicycle?
- Do you fix your younger brothers' and sisters' toys?
- Are you good at repairing things around the house?
- Do you like to read about new inventions?

Electrical engineers apply what they know to solve practical problems.

- Do you like word problems in math?
- Do you like to solve engineering problems around the house, such as the best way of putting up a shelf?
- Do you wonder what relation your school subjects have to the real world?
- Are you more likely to study if you think a subject has practical value?

Electrical engineers deal with many ideas and objects that cannot be seen or felt. They must be able to think abstractly.

- Can you look at a pattern for a model or for clothing and picture the finished product?
- Can you look at a machine such as an automobile and picture its inner workings?

Electrical engineers look for creative answers to problems.

- Do you play games of strategy such as checkers, chess, or bridge?
- Do you enjoy solving puzzles?
- Do you like to think of new ways of doing things around the house?

Electrical engineers must pay attention to detail.

- Do you enjoy projects that involve precise, detailed handwork?
- Do you enjoy doing needlepoint? Painting by numbers? Building and rigging model ships? Building a radio from a kit?
- Do you go over your homework carefully before you hand it in?

Electrical engineers must continually read and learn, because new discoveries and inventions are made all the time.

- Do you like to read for pleasure?
- When you are curious about something, do you go to an encyclopedia or library to learn more about it?
- Do you like to read any popular scientific or technical magazines?
- Do you look up words you don't know in a dictionary?

Electrical engineers must be able to write clearly.

- Can you write street directions or other instructions?
- Can you write a recipe?
- Do you write your math or science homework clearly enough for others to follow it?

Electrical engineers must be able to discuss technical subjects.

- Can you express yourself well?
- If a teacher doesn't answer your question exactly, do you ask it again in a different way?
- Can you help your brothers, sisters, or friends with their homework?

Suggested Activities

Prepare a report on electric power in your community for your science or English class. Describe where and how the electricity you use is generated. Explain how it travels to your home. Explain how the quantity of electricity is measured and how much is used in your area. The community relations department of your local power company may have brochures and pamphlets that you can include in your report.

Arrange a class tour of a power station.

Prepare a report about electric current for your science class. Explain the difference between alternating and direct current (AC and DC). What kind of current is used in an automobile engine? A flashlight? Your home? How can you tell whether an electric line has AC or DC?

Learn about electricity on your own. Look for books on electricity in your school or public library. Some books outline simple experiments you can perform.

Experiment with electrical circuits. Hobby shops have kits that you can use to experiment with different kinds of simple circuits. Learn how to draw a diagram of a circuit. Find out what each symbol stands for.

Prepare a report for your science class about home appliances that use electricity. Which are electronic? What do the electronic appliances have in common? Explain why some appliance plugs have two prongs, while others have three. What is the purpose of the third prong?

Ask your parents to show you the fusebox or circuit breaker panel in your home. Find out why it is needed and what to do if a fuse or circuit breaker pops.

Build a crystal radio set. You can get help from books at your school or public library.

Become a ham radio operator. (Ham radios should not be confused with citizen's band, or CB, radios. With CB you can communicate only by voice and only over short distances. With a ham radio you use Morse code as well as voice, and you can broadcast all over the world.) To get your first license, you must demonstrate knowledge of radio concepts and the ability to understand Morse code at the rate of 5 words per minute. For full information, write to the American Radio Relay League, 225 Main Street, Newington, Ct. 06111.

Invite an electrical engineer to speak to your class about his or her job.

If you are a Boy Scout, try for merit badges in Electronics and Engineering.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops also offer opportunities to test career interests through proficiency badges in a number of areas such as Science.

Join an Electronics or Engineering Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Enter a project on electronics in a science fair.

Visit a museum with your science class. Concentrate on the exhibits on electronics, computers, aviation, and space travel. Prepare questions for the museum guide on the contributions engineers have made in these areas.

To see if you can think abstractly, like an engineer, play mental tic-tac-toe. Picture the board in your mind, with each square numbered, one through nine. Play each turn by saying out loud the number of the square you want to mark. If one player forgets and names an occupied square, the other player wins. You'll have to concentrate to remember all the plays. It's harder than it sounds!

Write for the pamphlet on careers put out by the Educational Services Department, Institute of Electrical and Electronic Engineers, Inc., 345 East 47th Street, New York, New York 10017.

Related Occupations

Many kinds of engineers design, develop, and test products or systems. Electrical engineers are one kind. The names of ten others are listed below in jumbled form. See if you can figure out what they are. To help you, next to each name there are examples of the products or systems that the engineer works on.

1.	AIRMEN	Steam engines for ships.
2.	ANCHEMICAL	Air-conditioning systems.
3.	CANRULE	Atomic reactors.
4.	CAUREALATION	Airplanes and rockets.
5.	CEMICAR	Glass and tile.
6.	CIMLEACH	Rubber and plastics.
7.	ILVIC	Bridges, dams, and roads.
8.	PARTNATIONSORT	Streets and highways.
9.	TOOTUMIVEA	Car and truck motors.
10.	TOPICAL	Telescopes and cameras.

See answers at end of chapter.

Exploring Careers

Broadcast Technician

Technical school training in electronics led to a career in broadcasting for Edna Tower.

Scientific and Technical Occupations

Edna Tower held up her right hand, palm forward, like a courtroom witness taking an oath. Punching a lighted button in front of her with her left hand, she heard the tape reels begin to spin. Then she closed her right fist and pointed her index finger forward. The woman on the right side of the double glass began reading in a crisp, pleasant voice from a page in front of her: "Looking for a truly professional dry cleaner? Then come to Top Notch Cleaners at six locations in Springfield . . ." While the announcer's voice radiated from speakers in the control room, Edna watched the sound meter needles bounce and adjusted a slide control here and there. When the reading was finished, she punched another button to stop the tape. The women left the studio and Edna prepared for her next assignment.

Edna Tower works at radio station WELL as a production technician or engineer. WELL broadcasts classical music on AM and FM, and while located in a major city, the station employs a relatively small staff. This means that an experienced technician like Edna has many different kinds of duties each day. She enjoys this variety. Even though the big operations like rock 'n roll WAIL or news station WHAT could offer her more money, "they have you doing the same thing all day," explains Edna.

Edna had arrived at the station a bit before 9:30, had drink a quick cup of coffee with one of the announcers, and was now in her control room.

Control room 3 is where Edna spends most of her time. She sits at a control board directly in front of the window facing the studio. The board has dozens of buttons, dials, meters, and slide switches that allow her to set sound levels in the studio, mix sounds from different sources (such as a speaking voice and background music), and operate the turntables and tape recorders in the room. From this board she can even control a live broadcast coming from outside the studio, such as a concert at the local symphony hall. Edna is particularly proud of this equipment, which she installed herself. At a larger station she might not have been given the opportunity. And she knows those buttons and switches by heart. "When you're in the middle of a performance, you can't take time to look at the board. You have to know where everything is by feel." The control room also contains three turntables for playing records, three reel-to-reel tape decks, two machines that play cartridge tapes (known as carts), plus devices for erasing used tape and cabinets containing tapes and tools.

Edna had begun this particular workday with the daily ritual of checking the equipment. First she had cleaned and "demagnetized" the "heads" on the tape decks (the small metal parts that touch the tape as it moves and actually create or erase the recording). Cleaning them requires only a wipe with a cotton swab dipped in alcohol, while a special electrical device, called a demagnetizer, is used to remove any unwanted magnetic interference that might make the recordings noisy. Next she had checked the machines overall to be sure they were running smoothly. (Once a week they would be tested more thoroughly, with electronic tools).

Shortly before 10, Renee Baily, the assistant programming director, had walked into the room with a pencil behind her ear and a clipboard in her hand. "There's a change of schedule," she had said. "The woman from the hospital came in early, so we'll tape her interview right away, then do the commercial spots, and do Lisa's program at 11."

Edna had glanced at the production schedule taped to the wall. The mimeographed sheet showed her workweek in half-hour slots and listed her assignments next to them. At 11 today she was scheduled to tape an interview with Emma Swenson, the special projects coordinator for the city's hospital for children. John Griffin, one of WELL's announcers, would conduct the interview. Since Mrs. Swenson had arrived early, they would do the interview immediately. Lisa Dillich's music appreciation program, which Edna was scheduled to record at 10, would be postponed.

Just then John walked in and introduced Mrs. Swenson. Edna then led them into the studio.

Much of what WELL's listeners hear on the air takes place in this 12- by 14-foot room called Studio 4. Inside the room one finds a carpet-covered table with several chairs, a grand piano, half a dozen large microphones on long stands, and an endless tangle of electrical cords on the floor. Mrs. Swenson commented on the large potted broadleafed palm standing in one corner of the room. "The music makes it grow very well," replied Edna.

John and his guest sat down at the table. After positioning a microphone, or "mike", between them, Edna returned to her control board and adjusted the volume level while the pair chatted. She threaded a reel of tape on one of the decks, reminded Mrs. Swenson to avoid rustling papers, and then signaled to John through the window that she was ready to go. Edna talks to people in the studio over the intercom, except when she is recording. Then, she signals by hand through the window. She held up her hand to ask for silence, started the tape, and pointed at John to tell him to begin. At the same moment she started a timer. "We have a 15-minute slot on Sunday," said Renee, watching over Edna's shoulder. "So let's take about 20 minutes' worth and cut it to size."

While John and his guest talked, Edna made a few minor sound adjustments. As the 20th minute approached, John wrapped up the interview. Edna anticipated his last words and stopped the tape just after he uttered them. "Great interview!" exclaimed Renee. "We'll air it Sunday." As Renee left the control room to say goodbye to Mrs. Swenson, Edna rewound the tape and returned it to its box. Later she and John would decide which parts to edit out.

Edna checked her watch. "It's 10:30. Tom should be here any minute to do these commercials." And as she was spinning a reel of tape on the bulk eraser to make it as clean as possible, Tom Nardone, another WELL announcer, walked into the studio with a sheaf of papers. He sat down at the table and adjusted the mike to his height. Edna threaded the tape and sat down at the board. "Read to me," she told Tom over the intercom, adjusting the volume. "We have half a dozen ads here," Tom finally said, "so it may take about 20 minutes." "Fine," answered Edna, and as she started the tape, she signaled Tom to begin.

Tom read each commercial in turn. Edna captured them all on reel tape; later she would transfer each ad to an individual cartridge. Then, during a broadcast, it would simply be popped into the cart machine and played at the right moment.

After putting away the tape she had just used, Edna went into the studio to set up the mikes for Lisa Dillich's program. Lisa had a weekly series of 1-hour shows in which she explained music concepts (such as key, chords, and harmony) in a way that the average listener could understand. She would play one or two pieces of music at the beginning, then talk about them, playing the piano to clarify her explanation. Lisa's programs were one reason Edna liked working at WELL. Though she had never thought much of classical music before, Edna grew to enjoy it as she heard more and more at the station. Listening to Lisa's series taught her something about the theory behind music.

Preparing for Lisa's show posed a new problem: Setting up the mikes to make both voice and piano sound good. While studying mechanical engineering in trade school, Edna learned about acoustics (the science of sound) and tone. So she knew that the studio, like any room, had certain acoustical characteristics. She had recommended that to improve sound quality, special panels be hung on the walls of the studio, some to reflect and some to absorb sound. Changing a room in this way is called "tuning" it. A studio used only for voice would be tuned differently than one used only for music. In this studio, which was used for both, a compromise had to be made. With her experience and technical knowledge, Edna was able to arrange the mikes to achieve a good sound.

Lisa came into the studio and sat down at the piano with her script. After a sound test on Lisa's voice and the piano, Edna signaled her to begin. Lisa read her script, illustrating with the piano where necessary. When she reached the place in the script where two complete musical selections would be played, she paused and then continued reading. Later Edna would take the music from records and mix it with Lisa's voice recording into a master tape.

The session with Lisa lasted until a quarter to 12. Forty-five minutes until lunch, with no other assignment. Just enough time to transfer those commercials to carts and insert the music in Lisa's show.

Edna's schedule after lunch, from 1:30 to 5:30, looked much like the morning—more recording and editing. But not every day was the same. Tomorrow she wouldn't have to arrive at the station until 1:30 p.m. From 6:30 to 9:30 she would operate the controls for WELL's nightly live program. The next day she would spend "in solitary confinement" at the transmitter.

The transmitter, located on a hill five miles from the

Edna is proud of the station's equipment, much of which she installed herself. "I have to keep checking it to make sure everything works right."

studios, is the source of WELL's signal, the invisible waves that travel to people's radios carrying music and voices. WELL has four 450-foot towers clustered around a small building. One person stays in the building the entire time the station is on the air, to make sure everything runs smoothly and according to Federal regulations. These tasks often require very little time, so the job can get lonely. But Edna rarely spends more than 2 or 3 days a month at the transmitter. And soon it will be operated by remote control from the studios.

The transmitter shift also gives Edna a chance to study for her evening classes in electronics. Although she attended technical school for 2 years after high school to get the necessary First Class Radiotelephone Operator's License, she wants to increase her knowledge of electronics, in order to keep up with new developments and to remain competitive in her occupation. The community college offers a degree in electronics, and Edna hopes to have hers next term.

Generally, Edna Tower is satisfied with her job. She uses knowledge of electronics, acoustics, and music. She installs and repairs the equipment as well as operates it. She does many different things. And she does them all with pride. Anything it takes to improve WELL's sound quality, she's willing to do. Her only complaint is that WELL's listeners don't know about her work. "The better job a technician does, the less it's noticed. I'm behind the scenes—the audience may not even know about my part in presenting a show."

Exploring

Technicians must train their ears to pick out imperfections in the recordings they make and in the broadcasts they engineer.

- Do you like to listen closely to music and pick out its different parts?
- Can you tell a good recording from a poor one?
- When listening to the radio, do you adjust the tuning to get the best sound from the station?

Technicians often have odd work schedules.

- Would you mind working nights, early mornings, or weekends?
- Could you adjust to having different working hours each day of the week?

Technicians often must operate controls continually through long broadcasts.

- Can you sit still and pay attention to something for a long period of time?
- Can you be patient during classes that don't really interest you?
- Do you play long games such as Monopoly?
- Do you watch TV programs that run 2 hours or more?

Technicians usually spend most of their workday in a few small studio rooms.

- Would you be satisfied working inside all day long?
- Would it bother you to spend the day in a small room with no outside windows?

Technicians often are given new tasks before they finish their current ones.

- Are you able to handle several projects or homework assignments at the same time?
- Can you finish them all on time?
- Is it easy for you to switch back and forth from one project to another?

Technicians must think and act quickly if something unexpected happens during a broadcast.

- Can you stay calm and act sensibly if a toilet overflows, the lights go out, the roof leaks, or some other emergency occurs at home?
- Do you know whom to call if something goes wrong when your parents are away?
- Are you good at handling crises on the school grounds or playground?

Technicians must keep an eye on several things at once.

- Can you cook a whole meal yourself and have everything ready at the same time?
- Do you enjoy watching sports such as football, basketball, soccer, or hockey in which you have to keep track of many players at once?
- Do you play complex games like chess or bridge?

Technicians work with their hands.

- Do you have any hobbies or crafts that require fine handwork?
- Are you good with tools?
- Do you play a musical instrument?

Exploring Careers

Suggested Activities

Arrange a tour of a radio or TV station for yourself or your class. Prepare questions for the employees about their work.

Listen to the radio. Pick out the recorded voices (such as repeated commercials and jingles) from the live voices (disc jockeys and news announcers). Try to imagine how the recordings were made and how they are played during the program. This activity may be easier after doing the preceding one.

Listen to AM radio at two different times of day, once during daylight (say, 4 p.m.) and once after dark (say, 9 p.m.). Each time pick a dozen or so stations, listing

As a radio station technician, Edna works strictly behind the scenes. "My job is to see that our listeners get good quality sound."

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the call letters (such as WDAD or KMOM), location, and, if possible, frequency (number on the dial) of each. Do you notice a difference between the two lists? The stations on the daytime list are likely to be broadcasting from a much shorter distance away than those on the night list. Investigate the reason for this.

Build a crystal radio set. You can get help from books at your school or public library.

Become a ham radio operator. (Ham radios should not be confused with citizen's band, or CB, radios. With CB you can communicate only by voice and only over short distances. With a ham radio you use Morse code as well as voice, and you can broadcast all over the world.) To get your first license, you must demonstrate knowledge of radio concepts and the ability to understand Morse code at the rate of 5 words per minute. For full information, write to the American Radio Relay League, 225 Main Street, Newington, Ct. 06111.

Prepare a report for your science class. Answer the following questions in your report: What do AM and FM stand for? What is the difference between the two? What are the advantages of each? How and when did each come into existence? What are some of the other bands, and how are they used? Include in your report a diagram and an explanation of how sounds travel from a source to the listener's radio.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to test career interests through proficiency badges in a number of areas including Radio and Television.

If you are a Boy Scout, try for merit badges in Communications, Electronics, Public Speaking, and Radio.

Join a Broadcasting, Electronics, Amateur Radio, or Communications Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for information on careers to the National Association of Broadcasters, 1771 N Street, N.W., Washington, D.C. 20036 or to the Corporation for Public Broadcasting, 1111 16th Street, N.W., Washington, D.C. 20036. For information on the Radiotelephone Operator's License, write to the Consumer Assistance Office, Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554. For information on technical careers, write to Technical Careers, Box 111, Washington, D.C. 20044.

Related Occupations

Does a career as a broadcast technician interest you? "Yes and no," you may say. Or, "I'm not sure." You might find it worth looking into other occupations that are similar to broadcast technician.

If you like the idea of working in radio but don't want such a technical job, picture yourself behind the microphone. As a *radio announcer* or *disc jockey*, you would talk to the listening audience. Your work might include announcing and playing records; reading commercial and public service messages; and doing news broadcasts and interviews.

Or maybe you'd rather work in television. As a *TV production technician*, you would engineer a TV broadcast much the way Edna engineered a radio program. You might also enjoy capturing the action as a *video camera operator*.

You may not have thought about it, but the music industry employs technicians, too. As a *recording engineer*, you would set up microphones in a studio and operate the sound equipment while a singer or an orchestra made a recording. The recording is made in several different parts, or tracks. As a *recording mixer*, you would adjust the tracks and blend them together in the way that would sound best on the finished record.

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Job Facts

There isn't room in this book for a story about every scientific and technical occupation. However, you'll find some important facts about 28 of them in the following section. If you want additional information about any of these occupations, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
LIFE SCIENCE OCCUPATIONS			
Biochemists	About half of all biochemists work for colleges and universities, while a fourth work for private companies. The rest work for government agencies, private research institutes, or for themselves.	A graduate degree is necessary. A bachelor's degree in biochemistry or chemistry may lead to a job as a research assistant or technician. People with jobs as biochemists, especially in research or teaching, generally have a graduate degree in biochemistry.	The great majority of biochemists hold research positions, rather than managerial or other positions.

Scientific and Technical Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Life Scientists	Most life scientists work for colleges and universities as teachers and researchers. Many do research in hospitals and other medical institutions. The drug, chemical, and food processing industries employ large numbers of life scientists, as do Federal, State, and local government agencies.	A bachelor's degree in biology may lead to a job as a research assistant or technician; a career as a life scientist, however, generally requires a graduate degree.	Life scientists specialize in a wide variety of subjects. They may concentrate on either plants or animals, or even study just one kind of plant or animal. Some study breeding while others investigate diseases. Still others examine drugs and their effects on living things. Life scientists perform many different kinds of work, from research and teaching to advising, managing, and writing.
PHYSICAL SCIENTISTS			
Astronomers	Most astronomers teach and do research in colleges and universities. Many others work for the Federal Government and for private observatories.	A doctoral degree in astronomy is necessary for most jobs. To qualify for a graduate program in astronomy, a student should have a bachelor's degree in astronomy, physics, or math.	The majority of astronomers spend most of their time working in offices or classrooms, rather than at telescopes.
Chemists	About three-fourths of all chemists work in private industry. Chemical manufacturers employ almost half of these, and the rest work for food, scientific instrument, petroleum, and other industries. Quite a few chemists work for colleges and universities.	A college education is necessary. Beginning jobs are open to people with a bachelor's degree in chemistry, but a graduate degree is necessary for some research and teaching positions, and is useful for advancement.	Most chemists perform basic research or research and development. In basic research, a chemist explores the properties of matter and the combination of elements. A chemist in research and development creates or improves products for direct use.
Food Scientists	Food scientists work all over the country for companies in the food processing industry as well as for Federal and State agencies, colleges and universities, and other organizations.	A college education is necessary. A bachelor's degree in food science, biology, or chemistry is the minimum requirement for beginning positions. Many jobs, especially teaching and research, require a graduate degree.	Many food scientists work in research and development of new food products and processing techniques.
Physicists	Nearly half of all physicists teach or perform research at colleges and universities. Many others work in chemical, electrical equipment, aircraft and missile, and other manufacturing companies.	Graduate study in physics is essential for most beginning positions and for all advanced ones.	Physicists usually specialize in a particular area, such as nuclear physics, optics, or acoustics.
ENVIRONMENTAL SCIENTISTS			
Geologists	Most geologists work in private industry, for petroleum, mining, quarrying, and other companies. Many work for Federal and State agencies and colleges and universities.	A college education is necessary in this occupation. While a bachelor's degree is enough for some starting jobs, a graduate degree is helpful for promotion.	Geologists may work outdoors much of the time, depending upon their specialty. They often work in offices and laboratories, however.

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Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Geophysicists	Most geophysicists work in private industry, for petroleum, natural gas, mining, and other companies. Most of the others are employed by Federal and State government agencies or by colleges and universities.	A college education is necessary in this occupation. A bachelor's degree in geophysics is sufficient for most beginning jobs. A degree in a related field is also adequate, as long as the student has taken certain courses. For higher positions in research, exploration, and teaching, a graduate degree is desirable.	Many geophysicists work outdoors and travel extensively. Some work at research stations in remote areas or on ships or aircraft.
Meteorologists	The National Oceanic and Atmospheric Administration, private industry, and colleges and universities all employ meteorologists. The Department of Defense employs civilian meteorologists in addition to those in the military services.	A college degree is necessary. A bachelor's degree in meteorology or a related science is the minimum requirement for starting jobs. A graduate degree is important for promotion, and essential for research and college teaching jobs.	Not all meteorologists forecast the daily weather. Some work in climatology, the study of long-term weather trends; others administer programs or teach.
Oceanographers	About half of all oceanographers teach or do research at colleges and universities. A fourth work for Federal agencies. The rest work for other government agencies and for private industry.	A college education is necessary. Most beginning positions require a bachelor's degree in oceanography, biology, earth or physical sciences, mathematics, or engineering. For many advanced positions, however, an advanced degree in oceanography or a basic science is desirable.	Some oceanographers are away from home for weeks or months at a time while on ocean research voyages.
MATHEMATICS OCCUPATIONS			
Mathematicians	About three-fourths of all mathematicians work in colleges and universities, the majority of them as teachers. Most others are employed in government and private industry.	A graduate degree usually is necessary. While a bachelor's degree may lead to a beginning job, promotional opportunities are limited without graduate study. A person seeking work as an applied mathematician in a field such as physics or economics needs training in that field as well as in mathematics.	Mathematicians can work in theoretical (pure) or applied mathematics. Theoretical mathematicians develop new mathematical techniques and knowledge without necessarily having a practical use in mind. Applied mathematicians use that knowledge to solve everyday problems in physics, engineering, business, economics, and other fields.
Statisticians	Most statisticians work for insurance firms, finance companies, public utilities, manufacturers, and research organizations. Many others work for Federal, State, and local government agencies.	A college education is necessary. Most beginning positions require a bachelor's degree either with a major in math or statistics or with a major in an applied field, such as economics, and a minor in statistics. Graduate training is necessary for teaching positions and helpful for promotion in other areas.	Because the science of statistics is used so widely in other fields, statisticians often work under other titles. A statistician working with information on the economy, for example, may have the title of economist.

Scientific and Technical Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
ENGINEERS			
Aerospace Engineers	Most aerospace engineers work for the aircraft and parts industry. Many others are employed by the National Aeronautics and Space Administration and by the Department of Defense.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Aerospace engineers often specialize in one area, such as structural design, navigation systems, or production methods. They may also specialize in a particular product line, such as passenger planes, helicopters, or satellites.
Agricultural Engineers	Most agricultural engineers work for manufacturers and distributors of farm equipment and supplies or for electric utility companies serving rural areas. Many do farm consulting work independently or for consulting firms. Others work for the U.S. Department of Agriculture, for colleges and universities, and for State and local government agencies.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	The work of agricultural engineers covers many different aspects of agriculture: Conserving and managing soil and water resources, designing farm equipment, and improving techniques for producing, processing, and distributing food.
Biomedical Engineers	Most biomedical engineers teach and do research in colleges and universities. Some work for Federal and State agencies or for private industry.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement. Biomedical engineers need some background in mechanical, electrical, industrial, or chemical engineering, as well as specialized biomedical training.	The small size of this occupation means that there are relatively few job openings each year.
Ceramic Engineers	Most ceramic engineers work in the stone, clay, and glass industries. Many others work in the iron and steel, electrical equipment, aerospace, chemical, and other industries that produce or use ceramic products.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Ceramic engineers generally specialize in particular products, such as heat-resistant material, porcelain, building material, glass, or cement.
Chemical Engineers	Most chemical engineers work for chemical, petroleum, and related manufacturers. Others are employed by colleges and universities and by government agencies.	A bachelor's degree in chemical engineering is required for most beginning jobs. Graduate study is increasingly important for advancement.	Chemical engineering is a broad field with many specialties.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Civil Engineers	Most civil engineers work for government agencies or in the construction industry. Others provide engineering advice for consulting or architectural firms. Still others work for public utilities, railroads, and manufacturers.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Civil engineers may specialize in such areas as structural, hydraulic, sanitary, and transportation systems.
Electrical Engineers	Electrical engineers are employed in private industry by manufacturers of many different products, particularly electrical and electronic equipment, aircraft and parts, and business machines. Others work for public utilities, government agencies, and colleges and universities.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Electrical engineers generally specialize in a major area such as computers, communications, integrated circuits, or power distribution.
Industrial Engineers	Industrial engineers are employed by a greater variety of industries than any other type of engineer. Most work for manufacturing firms, but many work for hospitals, insurance companies, banks, and consulting firms.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Industrial engineers concern themselves more with people, organizations, and business methods than do other kinds of engineers.
Mechanical Engineers	Most mechanical engineers are employed by manufacturers of metals, machinery, transportation and electrical equipment, and other products.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Mechanical engineers specialize in such areas as automotive engineering, marine equipment, heating and air-conditioning, and instrumentation.
Metallurgical Engineers	Most metallurgical engineers are employed by the iron and steel and other metalworking industries. Many work in the mining industry or for firms that manufacture electrical equipment, machinery, and aircraft.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Most metallurgical engineers specialize in one of three areas: Extracting metals from ore and refining them; studying the properties of metals and developing uses for them; and working and shaping metals into final products.
Mining Engineers	Most mining engineers are employed in the mining industry. Others work for mining equipment manufacturers, colleges and universities, and government.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Mining engineers often specialize in the mining of a specific mineral, such as coal.

Scientific and Technical Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Petroleum Engineers	Most petroleum engineers are employed by oil companies and by drilling equipment manufacturers. Almost three-fourths work in Texas, Oklahoma, Louisiana, and California, where most of the oil and gas is found.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement.	Most petroleum engineers concern themselves with ways of increasing the amount of oil and gas that can be removed from the ground.
TECHNICIANS			
Broadcast Technicians	Broadcast technicians are employed by radio and television stations. Most technicians work in large metropolitan areas.	A First Class Radiotelephone Operator License from the Federal Communications Commission (FCC) is required for most positions. For some jobs, a Third Class License is sufficient. High school courses in algebra, trigonometry, physics, electronics, and other sciences provide good background for this occupation.	A technician's range of duties depends upon the size of the station. Large stations may assign each technician a specific duty, while at small stations a technician may perform any task necessary.
Drafters	Most drafters work in private industry. Almost one-third of these work in engineering and architectural firms. The government also employs many drafters.	Most positions require training in drafting such as is available at technical institutes, junior and community colleges, university extension services, and vocational and technical high schools. Courses in math, physical sciences, mechanical drawing, and drafting are important.	Drafters usually specialize in a particular area, such as mechanical, electrical, electronic, aeronautical, or architectural drafting.
Engineering and Science Technicians	Most technicians are employed in private industry, though a large number work in government.	Most positions require technical training in a particular specialty. This is available through technical institutes, junior and community colleges, university extension services, and vocational-technical high schools. On-the-job experience, apprenticeship programs, and correspondence schools may also provide the necessary training.	More than two-thirds of all technicians work in engineering. Many work in the physical sciences, and the rest work in the life sciences.
Surveyors	The government employs many surveyors. Other employers include construction companies, engineering and architectural firms, and surveying companies.	Post-high school courses in surveying combined with extensive on-the-job training provide enough background for many positions. A degree in surveying from a junior or community college, technical institute, or vocational school is also sufficient. High school courses in mathematics, drafting, and mechanical drawing are helpful.	Surveyors often specialize in surveys for highways, real estate boundaries, maps, or other purposes.

Exploring Careers

Answers to Related Occupations

BIOCHEMIST

1. a, 2. c, 3. a, 4. b, 5. b, 6. c, 7. a.

ELECTRICAL ENGINEER

1. Marine, 2. Mechanical, 3. Nuclear, 4. Aeronautical, 5. Ceramic, 6. Chemical, 7. Civil, 8. Transportation, 9. Automotive, 10. Optical.

Exploring Careers

Mechanics and Repairers

Mechanic jobs involve considerable physical activity, but most require only moderate strength.

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Exploring Careers

It was Superbowl Sunday. Ed turned on the television set and sat down to watch the game. Even before he could open the bag of potato chips, the picture began to roll . . . and then it was gone. Not wanting to miss a minute of the game, Ed ran to the phone to call Kathy. He was sure he could watch it at her house. But when he picked up the phone, there was no dial tone. Annoyed, Ed decided to drive to Kathy's anyway. The car started with a roar. Then there was a loud crack, the roar turned into a weak wheeze, and the engine sputtered into silence. Very upset, Ed jumped out of the car and slammed the door. Too late, he realized that he had locked it. Inside the locked car, dangling from the ignition switch, was the key ring with his house key. As the first drops of rain began to fall, Ed looked into the sky and shouted, "Help!" This certainly wasn't his day. He hoped his team was having better luck than he was.

The help that Ed needed could have come from four people: A television service technician, a telephone repairer, an automobile mechanic, and a locksmith. These skilled workers could have repaired the machines that caused Ed's trouble. Like Ed, we all use machines and, at times, need mechanics to repair and service them. Many businesses and industries rely on these workers every day.

Have you ever thought about working as a mechanic? There are many jobs to choose from—so many that just listing all of them would take several pages. After all, every machine creates work for some type of mechanic. Just think about all the machines you see in a single day. Sooner or later, all of them need to be serviced or repaired.

Body repairers take pride in their ability to make damaged cars look like new.

What Do Mechanics Do?

What comes to mind when you picture a mechanic at work? You may see the feet of an automobile mechanic sticking out from underneath a car. Perhaps you picture an appliance repairer poking around the back of your refrigerator. Maybe you imagine a business machine mechanic repairing a typewriter in the office of your school. Or see a jeweler replacing the diamond in a gold ring.

So many different images come to mind, you might wonder what all these workers have in common. All of them use their minds and hands to fix things—air conditioners, farm equipment, motorcycles, pianos, or some other machine. Mechanics use their minds to find the cause of mechanical problems and their hands to correct the problems. Let's examine their work more closely.

A mechanic needs patience to do the job right.

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Mechanics and Repairers

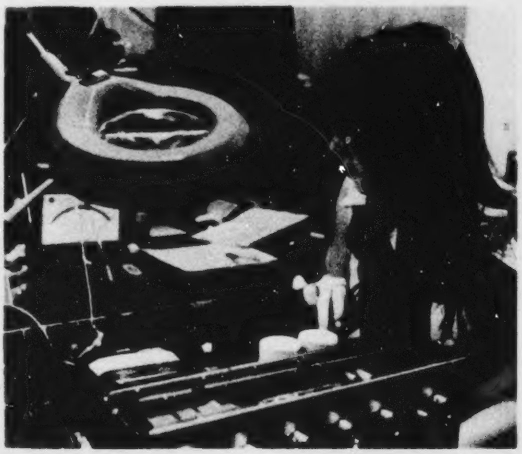
Mechanics Solve Mechanical Puzzles

Before mechanics can repair a machine they must find out why it isn't working. Why won't a boat motor start? Why doesn't a soda machine give the correct change? Why are the copies from a photocopier so light? This is just what a doctor has to do before prescribing treatment for someone who is sick. This "diagnostic work" often is very difficult, but many mechanics feel that solving the mechanical puzzle is the most interesting part of the job.

To find out why a machine will not work, mechanics first check the common and obvious causes of trouble. When an electric sign does not light, the mechanic begins by checking the bulb. If that's not the cause of the trouble. the mechanic looks elsewhere.

Mechanics search for clues to the cause of the problem in an orderly way. Their knowledge of how the machine works tells them where to look and what to look for. Mechanics may listen to a motor for a telltale whine. They may test electrical circuits to see if electricity is running through them properly. They may take a machine apart. They do whatever is necessary to check the possible causes of a mechanical problem. Because many machines are complex, mechanics often rely on repair books and technical manuals to guide their search.

Trial and error also plays a role in the search. If adjusting the do-hickey does not make the widget work, maybe the gizmo should be tightened. However, even this is done in an orderly way. Mechanics know what to do if the first repair does not do the trick. Their knowledge shows them how to try, try again.



Finding the cause of a problem in a stereo amplifier is like solving a puzzle.

Mechanics Correct Mechanical Problems

Once mechanics have determined why a machine will not work, they make the necessary repairs. The repair work often involves taking apart a machine and repairing or replacing worn or broken parts. However, it may be possible to fix a machine by simply turning a screw that tightens a rubber belt or scraping the rust off an electric contact. Some machines are harder to repair than others. There's a big difference between repairing a toaster and repairing a diesel engine.

To make repairs, mechanics work with their hands and with tools. They use common hand and power tools such as screwdrivers, pliers, and electric drills. They also use special tools of the trade. Shoe repairers, for example, use skivers—knives that are made especially to split leather.

This motorcycle mechanic finds that time passes quickly when he is absorbed in his work.

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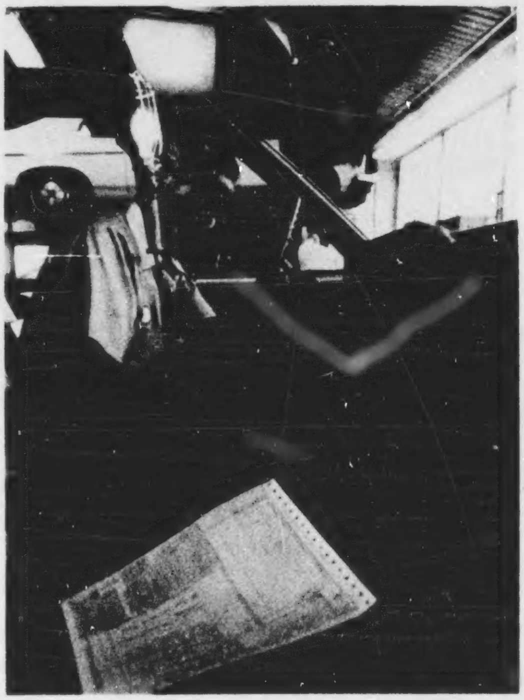
Jet engine mechanics help make air travel safe.

Mechanics Prevent Mechanical Problems

Many mechanics spend much of their time keeping machines in good working order. This is called maintenance work. Most machines need regular maintenance work to keep them in top condition. If the engine in a bus is not tuned regularly, it will run poorly and use more fuel. Eventually it will break down. Maintenance work is especially important with machines that must not fail in use. If an airplane engine has a problem, the mechanic had better spot it while the plane is on the ground!

Mechanics Do Other Things

In addition to repair and maintenance work, mechanics do other things. Some install machines—telephones, for example. Some mechanics do paperwork; they may record the amount of time they spend on a job or accept payment from customers. Experienced mechanics may train new workers. Mechanics who have their own repair shops order supplies, hire and supervise other workers, and keep the records for the business.



This auto mechanic is getting a new car ready for a customer.

Mechanics and Repairers

What Makes a Good Mechanic?

What does it take to be a mechanic? If you asked employers or experienced mechanics that question, you'd probably get several answers.

- "You have to be good with your hands."
- "You have to understand machines."
- "You have to know how to use tools."

All these descriptions refer to something often called "mechanical aptitude." People who have mechanical aptitude have a knack for understanding how machines work and for fixing them. It's a knack that is essential for anyone who wants to work as a mechanic.

The ability to solve problems is an important part of mechanical aptitude. Repairers must be able to understand what makes a machine run. What does each part do? How do the parts work together? What can happen to the parts to cause trouble? Mechanics must be able to use this understanding to answer the questions, "What's wrong with this machine?" and "How do I fix it?"

Another important part of mechanical aptitude is the ability to work with your hands and with tools. This may seem easy. After all, many people work with their hands and use the same tools mechanics do. It would be exaggerating to say that mechanics need the hands of a surgeon, but manual skill is important. You may be able to take a watch apart. And you probably can learn to put it back together so that it works. But do you have enough manual dexterity and eye-hand coordination to fix dozens of watches in a single day? You would need those skills to earn a living as a watch repairer. To put it another way, a lot of people play basketball, but only a few are pros.

In addition to mechanical aptitude, there are other characteristics that are helpful to a mechanic.

Ability to work under pressure. Whether mechanics are repairing a pinsetter in a bowling alley or a generator in a factory, they often must work quickly so that customers are not inconvenienced.

Ability to work without supervision. On most repair jobs it is just the mechanic and the machine, one to one. Mechanics set their own schedule and pace, but they have to get the work done, on time and correctly.

Good eye-hand coordination is needed to install telephone wiring.

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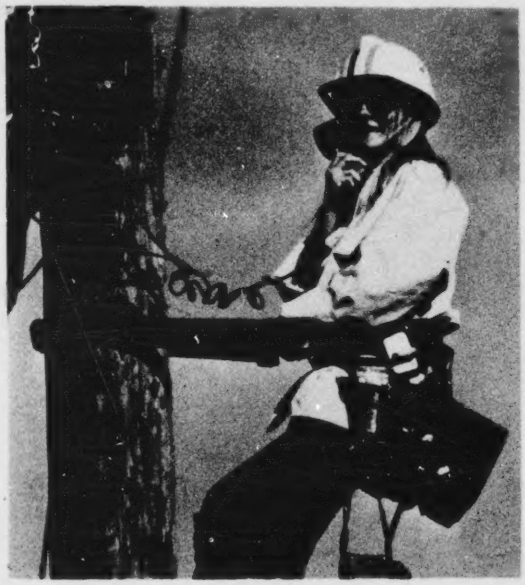

Telephone line installers must be agile.

Stamina. Some mechanics are very active workers. They may stoop, bend, kneel, and crawl around machines. They may lift, push, and pull machines, tools, and spare parts. They may climb ladders and scaffolds or drive a repair truck many miles during a day.

Patience. Finding and fixing the problem in a machine may take hours or days. If the mechanic rushes through a job, it could cause more trouble later.

Tact and courtesy. Mechanics often have to deal with customers and machine operators who are upset because their machines are not working.

Training for Mechanic and Repair Occupations

Repairing is skilled work. It takes training to learn how a machine runs and how to fix and service it. For most repair occupations there are several ways of getting the training you need. To find out about training requirements in specific mechanic and repair occupations, see the Job Facts at the end of this chapter.

You may be preparing for your career already. Do you read about machines—what they do and how they do it? If so, you are developing a background in basic mechanics that will help you understand more difficult repair books and technical manuals later on. You may have hobbies in which you work with your hands. Perhaps you build models, make jewelry, or draw. Many mechanics get their start by doing repairs around their homes. Through activities such as these you learn to work with your hands and to use tools.

High school is the first step to a career as a mechanic. You may have heard that mechanics do not need a high school education. In some occupations this is true. However, all employers prefer to hire high school graduates. And in high school you will learn a lot that will help you later on. In mathematics classes you work with numbers and solve problems—good practice for solving mechanical problems later on. In science classes you study physics and electricity. These subjects help mechanics understand how machines operate.

Many high schools also have classes in woodworking, metalworking, drafting, electronics, and specific types of repair work such as appliance repair, auto mechanics, and television and radio repair. These classes provide good experience, because you work with the same kinds of machines and tools in class that you would use on the job. Such high school courses may give you the skills you need to land your first job or open the way for further training.

After high school, there are several ways to train for a career as a mechanic. You can attend a vocational school or a community or junior college. These schools offer training in almost every type of repair work. Such training programs sometimes are preferred for mechanics who repair complex machines, such as computers, business equipment, and electronic instruments.

In many mechanical occupations you can start work immediately after high school and train on the job. You learn the trade by observing and helping experienced mechanics. You can train for some occupations through apprenticeship. Apprenticeships combine on-the-job training with classroom instruction in job-related subjects, such as blueprint reading, electrical theory, and safety practices. You may have to belong to a union or already work for a company to be eligible for an apprenticeship.

Another possibility is the military, which employs many mechanics. You can train and get valuable experience for many repair occupations in the Armed Forces.

Once you become a mechanic, it won't take long to learn that your training never ends. Every year machines are improved and made more complex. Hundreds of new machines are introduced. To keep up with these changes mechanics must continue to train throughout their careers. You will have to study new repair books and technical manuals. You may have to attend classes run by companies that make machines or even take classes at a high school or a community or junior college. There always will be something new to learn.

Mechanics and Repairers

Auto Mechanic

SHELLUBRICATION
TIRES & TUBES
SAFETY IN

Mechanic Carlos Romo and mechanic trainee Pamela Dobbins.

The sky was slate grey and the rain had slowed to a fine mist. It was surprisingly chilly for a late May morning. A wave of cold damp air greeted Carlos Romo as he stepped out of the tow truck. A tractor trailer roared by. Carlos shivered a moment. "Glad I wore my Army field jacket," he thought.

This was the first repair call of a day that promised to be a long one. Carlos' partner was on vacation. The man who usually drove the truck was sick. The weather was lousy. And it was only 6 o'clock in the morning! Carlos had been fast asleep when the phone had rung . . . a driver on Route 29 needed emergency road service.

"What seems to be the matter?" said Carlos to the man who stood gloomily by the side of the road, leaning against a dark green sedan. "Am I glad to see you!" responded the man. Then he explained that his name was Jack Kelly and the trouble had begun when he had pulled off the road to check the windshield wipers. The wipers had been acting "funny". When Mr. Kelly had tried to start the car again, nothing had happened. So he had called Carlos. Carlos' was the only 24-hour towing service listed in the phone book.

Carlos slipped behind the wheel of the green car, then took a good look at the gas gauge and gear selector. No problems there; the car had gas and was in gear. From Mr. Kelly's description, Carlos was almost certain that the battery was dead. But it always paid to check everything. Carlos turned on the ignition. The engine would not turn over. Sure enough, the battery was dead. Now the question was, "Why?"

Carlos found the answer as soon as he opened the hood. The fan belt was broken. Without a fan belt, the car's alternator would not work. All the electrical systems—the lights, the radio, and the windshield wipers—had to use power from the battery. So much of the battery's power had been used already that there wasn't enough left to restart the car.

"Your battery is dead," said Carlos to Mr. Kelly.

"That's what I figured," replied Mr. Kelly. "Well, give me a jump and I can be on my way."

"I'm afraid not. The fan belt is broken. I can jump start the car but the battery would just die again. I'll have to tow you into the shop and replace the belt."

Frustration was written all over Mr. Kelly's face.

"Are you sure there's nothing you can do here to get it to run? I have to be in Philadelphia by tonight."

"Sorry," replied Carlos. "I don't have a belt here and the battery should be recharged, if it can be. It may be totally gone. You might need a new one."

"Well . . . okay. Let's go."

Carlos hooked the car to his tow truck and drove to his garage.

The garage was a small rectangular building with bare cinder block walls, a cement floor, and steel frame roof. On the left side in the rear was a hydraulic floor jack. Next to the jack were Carlos' workbench and tool chest. The workbench was littered with greasy rags, the parts of a disassembled carburetor, and some papers. In contrast, the tool chest and its contents were in perfect order and spotless. Carlos could work on a messy bench, but not with messy tools. Besides, the handtools had cost over $1,000 and he wanted to protect that investment. Storage shelves lined the back wall of the garage. The shelves were stocked with spare parts. Carlos did not keep a large supply of parts, just enough to handle common repairs and maintenance jobs.

Next to the shelves was a small room with a shower and some lockers. Tom's work area took up the right side of the garage. Tom was Carlos' partner. As usual, Tom's area was neater than Carlos'. Carlos often wondered how Tom could possibly work that way. . . .

Carlos lowered Mr. Kelly's car from the tow truck and pushed it near his work area. Then he returned to the front of the shop to speak to Mr. Kelly.

"This will take a couple of hours. There's a cafe down the block, if you want breakfast."

"I think I'll just hang around here," said Mr. Kelly.

"Suit yourself. I'll be making some coffee, if you want any."

Carlos could tell that Mr. Kelly's frustration was turning to impatience. Sometimes I wish I were back at the Service Center, he thought. No contact with the customers, just get the cars from the service manager and do the work.

As Carlos made the coffee, he remembered how excited he had been when Tom had first suggested that they start their own business. All they had to begin with was a tow truck and an ad in the yellow pages.

Business had been slow at first, but as time went on they had earned a reputation for honesty and good work. Their customers had begun asking them to service their cars. So Tom and Carlos had rented a service station and garage, hired a part-time truckdriver, and begun doing tune-ups, lube jobs, and minor repairs.

Now they had a small group of regular customers and all the work they could handle. In fact, business was so good that Tom and Carlos were thinking of dropping the towing service. "That might not be a bad idea at all," thought Carlos as he suddenly noticed Mr. Kelly glaring at him from across the garage. Carlos sighed and started to work.

Carlos used a hydrometer to check the battery's cells. The battery was not completely dead, which meant it could be recharged. Carlos disconnected the cables, removed the battery, and placed it in the recharger.

"How much longer?" demanded Mr. Kelly.

Carlos shows Pam how to use an engine tester. "You can learn a lot by helping friends fix cars," advises Carlos.

"About an hour," replied Carlos.

"Well, I guess that will have to do," replied Mr. Kelly.

"What's up, Carlos?" called a voice from the rear of the shop.

Carlos turned and saw a teenage girl walking toward him. It was Pam, his trainee.

"Nothing much, I'll be busy with this job for an hour or so. That station wagon out front needs to be tuned. Points, plugs, condenser, timing, the whole bit. If you have any trouble, just yell. The keys are on my bench somewhere."

"I could spend all morning looking for them in that mess," Pam said in mock horror.

"Very funny. Get to work," answered Carlos with a smile.

Pam went to the locker room to change.

Pam was a senior at Central High. Her auto repair teacher, a friend of Carlos', had asked him to give her a part-time job so that she could get some experience.

Carlos had hesitated at first. He was not sure he wanted to take the time to supervise an inexperienced worker. After all, his income depended on the amount of work he did. But then Carlos remembered how hard it had been to get his first job. He always had liked working on his car, or helping friends and neighbors with theirs. When Carlos had graduated from high school, he had tried to get a job as a mechanic. But there weren't many jobs for people without experience or training. It wasn't until Carlos got out of the Army—where he had taken training in automotive mechanics—that a shop owner was willing to give him a job. Now, with Pam, he had a chance to give someone else a start.

Carlos went to the storage area to get the belt that he would need. He checked a parts supply book to get the number of the belt that fit the car. He also noticed the supply of oil filters was low. When he returned to his bench, he wrote a note to himself to call the parts distributor and order some filters.

By the time Carlos returned to Mr. Kelly's car, Pam was working on the station wagon. Mr. Kelly was pacing back and forth.

It didn't take long to install the new belt. When Carlos had finished, he walked over to Pam.

"How are you doing?" he asked.

"Fine," she replied, looking up from her work. "But this car is a mess. Look at these spark plugs. I didn't

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"Being a mechanic has given me the opportunity to have my own business," says Carlos. "I prefer working for myself."

think a car could run with plugs that old. I think this thing needs more than a tune-up. The belts and hoses look worn. The oil is filthy. I bet the transmission fluid should be changed. I'd feel guilty sending it out with just a tune-up."

"Well," said Carlos as he glanced at the engine. "I'll take a look at it later. Then I'll call Mr. Howard and tell him what should be done. He'll probably want the work done. I'd better finish over there before that guy paces a rut in the floor."

Carlos went to the battery recharger; the battery was ready. Carlos replaced it as quickly as he could. All the time Mr. Kelly kept fidgeting.

When Carlos had finished, he tried to start the car. The engine coughed, sputtered, wheezed, and made several noises Carlos had never heard an engine make. But it started.

"It's fixed," shouted Mr. Kelly. "Sounds great."

"He's got to be kidding," thought Carlos. He suspected that something was seriously wrong with the engine.

"The car is running and it should get you to Philly, but the engine sounds like it needs more work," Carlos explained, "I can do it next. . . ."

"So long as it lasts through the trip, I'll be satisfied," interrupted Mr. Kelly. "I'll dump it soon anyway. It's always been a lemon."

"Okay. I'll get your bill," said Carlos as he walked back to his bench.

After Mr. Kelly had paid, he rushed to the car and called, "Thanks a lot, see you. . . ."

"Maybe sooner than you think," thought Carlos.

Mechanics and Repairers

Exploring

Automobile mechanics repair and service cars.

- Are you interested in machines and the way they work?
- Do you like to read about cars, motorcycles, and other motor vehicles?
- Have you ever wondered how cars run?
- Have you ever wondered why cars break down?

Automobile mechanics work with their hands. They use tools and must do their work quickly and skillfully.

- Do you like to work with your hands?
- Do you like to build models or repair things around your home?
- Do you ever help repair bicycles, mini-bikes, lawnmowers, or cars?
- Do you enjoy fixing things? Does it give you a sense of accomplishment?
- Are you handy with tools?
- Is it easy for you to learn how to use a tool you've never used before?

Automobile mechanics sometimes must search for the cause of car trouble. They have to solve mechanical puzzles.

- Do you like to work on written mathematics problems?
- Do you like to do three-dimensional puzzles?
- Do you try to solve problems in an orderly and logical way?
- Are you persistent? Will you work on a problem until you solve it?

Automobile mechanics use technical books such as repair manuals.

- How well do you understand technical reading? Your science and mathematics textbooks are examples. Do you enjoy this sort of reading?
- Can you use charts, graphs, and diagrams?
- Can you look at a drawing and picture the three-dimensional object in your mind?

Automobile mechanics usually work alone. They must have confidence in themselves.

- Do you like to work by yourself?
- Do you do your homework by yourself?
- Do you like to make decisions?

Automobile mechanics do strenuous work.

- Do you enjoy activities such as sports, hiking, dancing, or gardening?
- Do you like to be active most of the time?

Mechanics set their own work pace. A rushed job could cause more trouble later.

Suggested Activities

Read about cars. Your school or public library has books about automobiles and automotive repair. Newsstands often have magazines about cars. The owner's manual for your family car lists its service requirements. If some of these books and magazines are too technical to understand at first, don't become discouraged; many pamphlets are written for people without technical training. For example, you can write to the Consumer Information Center, Pueblo, Colorado 81009 to get the Federal Government's Consumer Information Catalog. Some of the booklets listed there tell how to recognize common car problems, change motor oil, and do a basic engine tune-up.

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Exploring Careers

Use school assignments to learn about cars. You might build a model of a gasoline engine for a science fair. Or write a report about different kinds of engines for an English or a science class.

The conversion to the metric system will affect the work of automobile mechanics. Mechanics will have to use different units of measurement for many items such as engine power (kilowatts rather than horsepower), tire pressure (kilopascals rather than pounds per square inch), and gasoline consumption (liters per 100 kilometers rather than miles per gallon). Automobile mechanics who repair foreign cars already use some metric measurements.

Use the topic of metric measurements in automobile servicing for a report in a mathematics class. You might begin your research by writing for information to the Office of Weights and Measures, National Bureau of Standards, Washington, D.C. 20234. That office also will supply a list, by State, of speakers who are willing to talk to groups about the metric system.

Look for opportunities to repair machines. Work with relatives and friends who repair or service cars, bicycles, or other machines.

If there are automobile or bicycle repair clinics in your community, attend them. These clinics give you a chance to learn basic repairs, such as changing tires.

Join an Automotive Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Find out if your school system has courses in auto mechanics. Ask the instructor to come and speak to your class.

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as auto mechanics, auto body, and diesel mechanics.

Work with your hands and use tools. Find out what tools you have in your home that mechanics use. Learn to use these tools. Repair and service your bicycle or old machinery such as a typewriter or a clock.

Arrange a class tour of a service department of an automobile dealership. Note that each mechanic may specialize in one type of repair. There may be a brake repairer, a carburetor mechanic, a front-end mechanic, a transmission mechanic, a tune-up mechanic, and a rattle, squeak, and leak mechanic.

Role-play a conversation between a mechanic and a customer. Pretend that you are the mechanic and ask one of your classmates to play the part of the customer. Explain an automotive problem to the customer. Use books about automotive repair as references.

Related Occupations

Would you like to keep engines running and wheels rolling? Repairing automobiles is just one way of doing it.

Unscramble the words listed below to find the names of other mechanics who work with gasoline engines or vehicles.

FARICRAT INAHMCCE

LBCYCIE ERIARRPE

OTAB NEENIG INAHMCCE

USB INAHMCCE

LSDEIE INAHMCCE

AMRF NEUIQPTME INAHMCCE

YECLROOTMC INAHMCCE

SALML ENNIGE INAHMCCE

KTUCR INAHMCCE

See answers at end of chapter.

Computer Service Technician

"I've always been curious about how things work," says Jackie.

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"Cunningham, call Mr. Arnold, Commerce National Bank," crackled the radio's speaker.

"Not again," groaned Jackie. She had left Commerce National only a half hour before. After she turned the car around, Jackie looked at her watch. Almost noon. Jackie wondered whether there would be time for lunch today. She already had worked through lunch twice this week.

At one of the busy intersections traffic slowed to a crawl.

"Why are there so many cars on the road on the busy days?" she thought. Jackie drummed her fingers on the steering wheel and looked about. She caught sight of the pile of papers, tools, and trash from fast food restaurants on the back seat of the car. "What a mess," she thought. "Almost time for the semiannual cleaning. I hate to use this car for anything but work, it's so sloppy."

A car horn blared. Another horn sounded impatiently behind her and Jackie stepped on the accelerator. Soon she was pulling into a parking lot near the Benton Building, where Commerce National had its offices.

Jackie grabbed her jacket and picked up the briefcase that held her tools, reports, and repair manuals. She didn't have to take much with her because supplies were stored right at the bank. Data Products, the company Jackie worked for, saw to that. The company also sent spare parts and repair instructions directly to the bank's computer center. That way Jackie and the other service technicians didn't have to carry a lot of supplies around or transport spare parts from Data Products' regional office.

In fact, Jackie sometimes worked for several weeks without going to the regional office at all. As she saw it, her job was taking care of the computer equipment at her three "accounts"—the Commerce National Bank, the County Hospital, and the Wilson Manufacturing Company. So naturally she spent most of her time in those places, not at the Data Products office.

As she rushed through the parking lot, Jackie put on her jacket. "It couldn't be much hotter," she thought as she hurried into the air-conditioned building. Data Products expected the service technicians to dress up for work and fortunately Jackie liked to. But a suit, even this cotton one, certainly could be uncomfortable during the summer.

Jackie pulled out her Data Products' identification card as she passed the bank's security guard and headed for the computer center. When she entered the center, Jackie quickly spotted Mr. Arnold, who ran the office.

"Is it the sorter again, Tom?" she called from across the room.

"Right," replied Mr. Arnold.

"I wish you could have arranged to have it break down when I was here a little while ago instead of making me drive back."

"That would be too easy," joked Mr. Arnold.

Jackie went to the side room where the sorter was located. The room also was used to store supplies and it was cramped. However, Jackie did not have to move the machine as she did in some offices.

The sorter was used to group bank documents in several ways. Checking accounts, for example, could be grouped by the amount of money in them. Twice during the past 5 days the sorter had failed to separate the papers correctly. From Mr. Arnold's description of what had happened, Jackie got an idea of what the problem might be. By listening to the machine she decided that the rubber belts and metal rollers that moved papers through the sorter needed adjustment. Although she already had fixed several of the belts, Jackie was sure that they were the cause of the trouble. She knew that it was not unusual for complex equipment to require several adjustments. She was used to visiting an office several times to fix a machine.

Jackie raised the metal cover on the front of the sorter and turned on the machine. She listened to the hum from the rollers and belts. In a few seconds she located a belt that seemed to need adjustment.

From a cabinet in the room Jackie took a can of oil and a rag. After pouring some lubricant on the rag, she held it against the moving belt for a few minutes. She turned off the machine and tightened a screw at the end of the roller that the belt wound around. This made the belt tighter. Jackie then let the sorter run while she watched and listened to the belt.

"I've got you this time," she murmured to the machine. She had begun to think the sorter had a grudge against her. From the very first time she had worked with electrical equipment—as a hobby when she was a junior high school student—Jackie had noticed that some machines seemed to have personalities. She'd had a lot of experience with data processing equipment since then, and it only confirmed her impression that machines could be as different as people. Yes, quite a bit of experience, now that she thought about it. She'd taken electronics courses in high school. Then the training classes at basic school when she'd first started working at Data Products. And 2 years on the job.

In a way Jackie preferred mechanical problems to the electronic ones, because they were easier to explain to the customers. She could show them a worn or loose belt. Most electronic problems were caused by burnt-out circuit boards. Jackie could locate a bad board with a voltmeter and she could replace it with a new one. However, a burnt-out board looked exactly like a new one. It was sometimes hard to convince customers who knew little about computers that those innocent-looking boards caused their expensive computers to go haywire.

Jackie closed the machine cover and put away her tools. From her briefcase she took a repair report form. She filled in the date, the machine model, the account's name, and the code letters for the type of breakdown and repair.

She made out a repair report for every service call. Data Products used the information on the forms to determine what kinds of problems there were with the equipment the company made. Engineers used the information to design machines that broke down less often and could be serviced more easily.

Returning to the main computer room, Jackie wrote the date and a brief description of the work she had done in the record book that was kept with the equipment itself. The information in the book would be used by other computer technicians who might work on the machine. Jackie also used the records to keep track of the maintenance that she had done on the machines.

After putting the record book away, Jackie walked to Mr. Arnold's office.

"I think I've fixed it for good this time. But I'd like to be here the next time you use it, just to make sure that everything's okay. Will you be using it soon?"

"Not until tomorrow," said Mr. Arnold.

"Hmm, I'm scheduled for training the rest of the week—well, my backup can handle any problem."

"Training again! I thought you'd already learned everything you needed to know in Data Products' basic school. And aren't you going to night school now?" said Mr. Arnold.

"At basic school I learned how to keep wise guys like you happy and machines like your sorter working," replied Jackie. "The training this week is for your new 360 printer, and night school is part of my plan for the future. I want to be an engineer one day. Then I'll be designing these computers instead of fixing them.

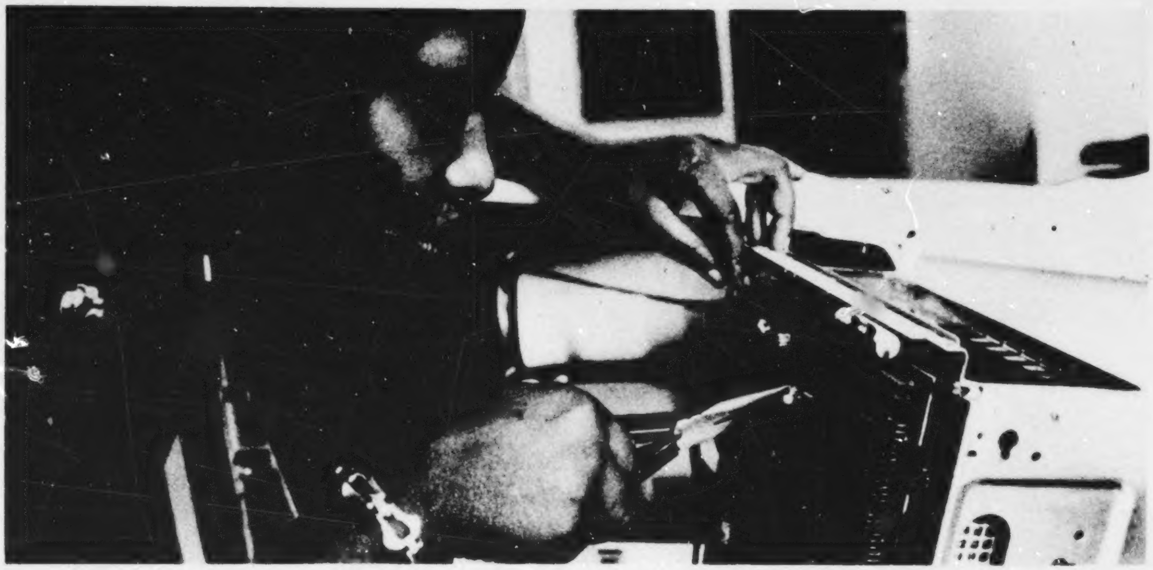
"Well, I'd better run;" Jackie continued as she picked up her briefcase. "We've been really busy the last 2 days and I'm supposed to do some maintenance at Wilson Manufacturing this afternoon. If I don't get it done Ken Marcus will have problems and he can be awfully disagreeable when his machines act up."

"Well, not everyone can be a nice guy like me," teased Mr. Arnold.

"True," replied Jackie. "See you next week."

"Take care," called Mr. Arnold, as Jackie rushed out the door.

Jackie called the office dispatcher from the security guard's desk to say that she had answered the Commerce National call. To her surprise there were no other repair calls. Jackie looked at her watch. There was plenty of time to get to the Wilson account. Suddenly she felt relaxed. "I guess I get to have lunch after all," she thought as she headed for her car.



"It's amazing how some computers seem to be personalities," remarks Jackie. "Machines can be as different as people."

Exploring Careers

Exploring

Computer service technicians repair and service keypunch machines, computer terminals, and other computer equipment.

- Do you enjoy fixing things?
- Do you like to work with your hands?
- Are you interested in electronics and computers?
- Have you ever wondered how computers work? Have you ever tried to find out how other kinds of electronic equipment work—television sets, stereos, tape recorders, or calculators?
- Do you read the owner's manual for calculators, television sets, stereos, or radios? Are you interested in finding out about the machines' specifications?
- Have you ever tried to fix a radio or a pocket calculator?

Computer service technicians must find and correct the cause of computer breakdowns quickly. They work under pressure all the time.

- Do you like to solve problems? Do you like to do written mathematics problems?
- Do you like to do word puzzles or brain teasers?
- Can you usually understand instructions the first time?
- Can you do manual work quickly without making mistakes?
- How well do you work under pressure? Do you have trouble taking tests?

Computer service technicians must get along easily with their customers.

- Do you usually get along with people?
- Are you outgoing?
- Do you enjoy doing things with people?
- How good are you at calming someone down when he or she is angry with you?
- Can you talk your way out of trouble?
- How well can you explain things? Can you give directions?

Computer service technicians spend a lot of time in their clients' offices. They must dress neatly and act professionally.

- Do you like to dress well?
- Do you try to make a good appearance?

Suggested Activities

Use class assignments to learn more about computers. You might do a project on electronics or computers for a science fair. Or prepare a report on electricity, electronics, or computers for a science or English class. Your library has books that can help you.

Arrange to have a computer service technician speak to your class.

Look for an electronic hobby kit in a hobby shop or department store. Visit a computer store if there is one in your area. Build a small computer from a kit.

Build a crystal radio set. You can get help from books in your school or public library.

Join a Computer or an Electronics Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

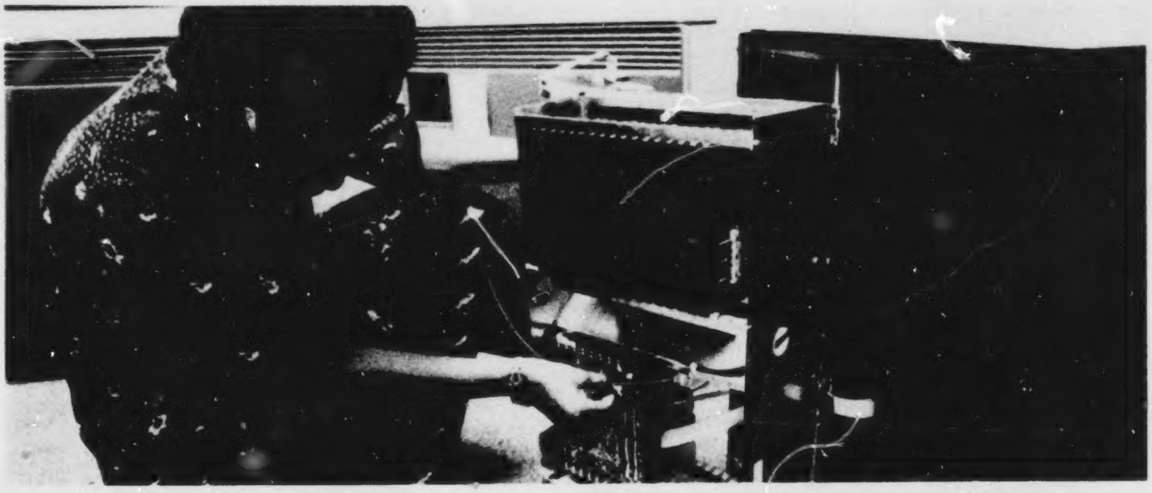
If you are a Girl Scout, see if your troop has the From Dreams to Reality program of career exploration. Scouts learn about electronics and machine repair through site visits, speakers, and actual experience.

If you are a Boy Scout try for Computer, Electricity, Electronics, Machinery, or Radio merit badges.

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as industrial electronics, electrical trades, and radio and TV repair.

Dealing with people is an important part of a technician's work. Try tutoring other students in mathematics or science to gain experience explaining problems.

Mechanics and Repairers



Jackie's ambition is to be an engineer. "Then I'll be designing computers instead of fixing them."

Related Occupations

Computer service technicians aren't the only mechanics who fix electronic machinery. Decode the words below to find others. Each number stands for a letter. Use this clue to get started.

1 = A
5 = E
9 = I
15 = O
21 = U
25 = Y

a. 1-16-16-12-9-1-14-3-5
18-5-16-1-9-18-5-18

b. 1-21-20-15-13-15-20-9-22-5
5-12-5-3-20-18-9-3-9-1-14

c. 2-21-19-9-14-5-19-19 13-1-3-8-9-14-5
13-5-3-8-1-14-9-3

d. 5-12-5-3-20-18-15-14-9-3 15-18-7-1-14
20-5-3-8-14-9-3-9-1-14

e. 9-14-19-20-18-21-13-5-14-20
18-5-16-1-9-18-5-18

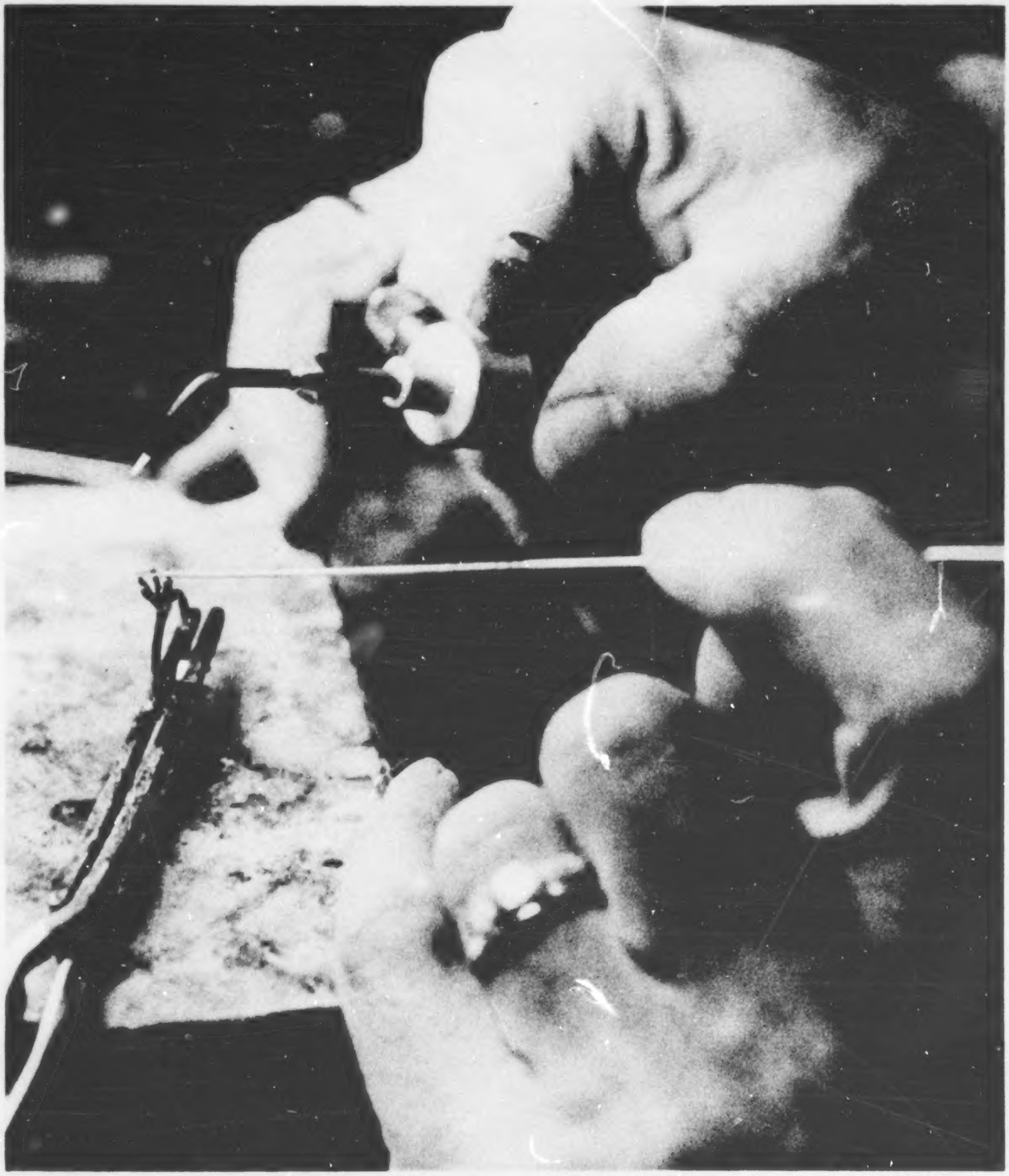
f. 18-1-4-9-15 18-5-16-1-9-18-5-18

g. 18-1-4-1-18 13-5-3-8-1-14-9-3

h. 20-22 19-5-18-22-9-3-5
20-5-3-8-14-9-3-9-1-14

See answers at end of chapter.

Jeweler



Mr. Anthony is a perfectionist. "I would rather lose money than do a job that I'm not satisfied with."

Mechanics and Repairers

The jewelry store was dark except for a single bright light in the back, where Mr. Anthony sat at his repair bench. Scattered on top of the bench were some tweezers and pliers, small brown envelopes, eyeglasses, wooden blocks, and gold wire.

Mr. Anthony straightened his back and stretched his arms over his head to loosen up before starting the next job. His eyes were tired from working under the bright light. He placed the bracelet that he had just finished in a small case lined with velvet.

Glancing at his watch he thought, "Less than an hour till the store opens. I'd better not start making Mrs. Blue's earrings. Once the customers begin coming in it'll be too hard to concentrate."

As Mr. Anthony placed the gold wire in one of the drawers, he looked at the brown envelopes on the top of the bench. One was marked, "Repair ring setting". Mr. Anthony picked up the envelope and removed the ring. Then he slipped on his magnifying glasses and examined it.

The ring was made of gold and had an emerald in the center. Two small loops of gold held the stone in place, but one of the loops had broken at the bottom. To fix the ring, Mr. Anthony would have to remove the stone and then solder the loop to the top of the ring. The work would be delicate (a slip of the pliers and the valuable stone could be chipped and ruined). However, Mr. Anthony had fixed many rings in the years he had worked as a jeweler. He knew that interruptions wouldn't bother him.

Using a pair of pliers, Mr. Anthony bent back both the loops of wire. He worked the stone loose from the small gold plate on which it was mounted.

The opening of the store's front door startled him. "Mr. Anthony, is that you?" It was Ms. Rothstein, the salesclerk.

"Yes, it's me, Deb."

"Have you been here long?"

"Only a few hours."

"Honestly, this is the third time this week that you've come in early. If you don't slow down, your ulcer will act up again."

"Well, with the holidays coming up, there's a lot of work to do and with so many customers coming in I can't work undisturbed during the day."

"I know, but you really should take it easy or . . ."

"Okay, okay! Let's get some work done," snapped Mr. Anthony. "Set the jewelry in the display cases and get ready to open the store."

Ms. Rothstein quickly returned to the front of the store. Her feelings were hurt, and it showed. He appreciated her concern, but he was tired and irritable. In a few moments Mr. Anthony was sorry that he had been rude. He made up his mind to smooth things over as soon as he could. After all, Deb was a first class salesperson . . . and a good friend. Funny how people you work with every day can become like members of your family, he thought. He put on his magnifying glasses and returned to work.

Before he could solder the wire, it had to be filed so it would lie flat on the top of the ring. With a few swift movements the filing was done. Using the pliers, Mr. Anthony bent the wire down so it touched the top of the ring. He examined the ring to be sure it was ready and stepped to the table where he kept his soldering equipment.

Holding the ring with tweezers, he dipped it in an acid solution that would keep the metal from turning black under the torch's flame. Placing the ring in a soldering clamp, he took a pack of gold solder from a drawer in the table.

"Excuse me," called Ms. Rothstein from the sales floor. "Did the gift boxes come in yesterday?"

"No, and I hope we get them today. We're almost out. If there's one thing we don't need now it's customers complaining about boxes. If they don't come in by noon, let's call Schmit's," he added.

Mr. Anthony took a piece of solder from a drawer in his bench. From this piece he clipped a speck of solder smaller than a grain of sand. Taking the torch from its stand, he lit it and adjusted the flame to a fine line. With the tip of an old file, he held the speck of solder to the break in the ring, then carefully but quickly applied the torch. In seconds the solder had melted in place. Mr. Anthony made sure he turned off the torch and replaced it in the stand. Once he had burned his hand because he had not turned off the flame completely. Mr. Anthony removed the ring from its stand and looked closely at the soldered joint. Everything was all right.

Mr. Anthony went into the back room where he kept his polishing machine. He took a wheel with bristles from a set on the table. After slipping the wheel onto the machine and turning it on, he touched the edge of the spinning bristles with a lump of abrasive clay called "tripoli." The tripoli quickly covered the end of the bristles. Holding the ring in his fingers he ran the soldered joint under the bristles. When he pulled the ring back from the wheel, the lump of solder was smooth with the joint. Mr. Anthony stopped the polishing machine and slipped on a different wheel. To the bristles on this wheel he applied jeweler's rouge (a red clay made of iron oxide). This time he polished the entire ring. Mr. Anthony then placed the ring in an ultrasonic cleaner. The cleaner used air bubbles to remove tiny particles of dirt. After a few minutes he removed the ring from the machine and examined it under a lamp. The gold sparkled under the light and there was hardly a trace of the soldered joint. But a jeweler could see that the solder was a different color than the gold.

"One more step," thought Mr. Anthony. Although many jewelers might reset the stone at this point, Mr. Anthony was a perfectionist. He would rather lose money than do a job that didn't satisfy him. To "do it right" he would goldplate the ring to hide the soldered joint. Mr. Anthony quickly set up the equipment to goldplate the ring. The process would take several minutes, so he leaned against the wall and relaxed.

"Do it right" had been Mr. Konczynski's motto, thought Mr. Anthony, suddenly remembering the days when he was first learning his trade. He had gone to Mr. Konczynski's jewelry repair shop as an apprentice when he was just 16 and stayed there 4 years. The apprenticeship had been hard. The pay was low and Mr. Konczynski was a demanding boss. Nothing less than perfect work would suit him. However, Mr. Anthony never regretted the years he had spent learning his trade. He had learned all types of jewelry work—stone setting, watch repair, jewelry making and repair, and modelmaking. These days, only a few shop or store owners hire apprentices. Most jewelers learn their trade in jewelry factories. But factory work is so specialized that a person usually can learn only one or two skills.

The buzz of the timer interrupted Mr. Anthony's thoughts. The goldplating was done. The ring had been covered by a new layer of gold. No one would be able to see it was soldered.

All that remained of this job was to reset the stone, but this was no simple task. The stone had to be set exactly right. If it tilted even a little, the ring would look lopsided. Further, when he was setting the prongs over the stone, a slip of his hand could easily chip or scratch the emerald.

As Mr. Anthony returned to his bench, Ms. Rothstein called from the sales floor.

"Mr. Anthony, could you step out here for a moment? This gentleman has a problem." She was standing behind a display case, across from a customer. Mr. Anthony straightened his tie, glanced in the mirror by his bench to see that his hair was neat, and went to the counter.

"How can I help you?" he asked the man on the other side of the counter.

"You can help me by giving me my wife's necklace," snapped the man.

"Mr. Johnson brought a necklace in to have the clasp fixed yesterday," explained Ms. Rothstein. "You weren't here at the time, so I put it on your table."

"If you could wait a few minutes, I can fix the necklace right now," he said.

"Well, I don't have a few minutes to waste," complained Mr. Johnson. "I have things to do and my wife wants to wear that necklace to a party tonight."

"It won't take long at all," said Mr. Anthony, reassuringly.

"I should hope not. After all the business I've given this store, I think I have a right to expect decent service."

Mr. Anthony did not wait for him to continue. He stepped back to his bench, took the necklace out of a brown envelope, and quickly replaced the clasp.

When he stepped back to the counter, Mr. Johnson said, "Well, it's about time." He was taking out his billfold when Mr. Anthony said, "No charge, to make up for the inconvenience."

"Oh! Well . . . thank you," said Mr. Johnson as he left the store.

"He is a good customer but he's hard to handle when he's rushed," said Ms. Rothstein.

"I know," sighed Mr. Anthony. "But I guess everyone gets a little touchy before the holidays. I'm sorry I snapped at you before."

"That's okay."

The door opened and Ms. Wang entered.

"Good morning, Ms. Wang. You've come for the ring?" said Mr. Anthony.

A slip of the hand could chip or scratch a valuable gem.

"Yes, I'm anxious to see it."

"It's in the safe in the back room. I'll get it."

Mr. Anthony returned to the sales floor holding a black ring box. He held the box under a fluorescent lamp on the counter and opened it. The ring in the box sparkled as the lamp light was reflected from the three diamonds which surrounded a ruby on the top of the ring.

Ms. Wang stared at the ring and murmured, "Beautiful, truly beautiful."

"I'm glad you like it," said Mr. Anthony.

Mr. Anthony had made the ring by hand following a design Ms. Wang had given him. He had used pliers to shape the ring from gold wire. He had made the settings for the stone from platinum in a similar fashion. It had been a long and difficult job but worth the effort. To Mr. Anthony the ring was a work of art in metal and stones.

"Ms. Rothstein will wrap the ring and make out your receipt," said Mr. Anthony.

"Fine," replied Ms. Wang. "Thank you again. You've done a magnificent job."

Mr. Anthony smiled broadly, then hurried back to his bench.

Mr. Anthony designs jewelry to suit the customer.

Exploring

Jewelers make and repair jewelry. They work with precious stones and metals.

- Does jewelry interest you?
- Do you like to look at jewelry displays in stores or in museums?
- Do you like to look at exhibits of precious stones and metals?
- Have you ever wondered how jewelry is made?
- Have you ever watched a jeweler or watch repairer at work in a store?
- Did you ever try to make or design a piece of jewelry or some other ornament?

Working from drawings or sketches, jewelers shape metal into pins, earrings, rings, and other jewelry. Their work must be attractive.

- Do you like to make or build things?
- Do you like to work with tools?
- Can you look at a drawing and picture a three-dimensional object?
- Are you interested in art?
- Can you explain why a piece of jewelry appeals to you?
- Do you select jewelry to match your clothing?

Jewelers must be able to do very delicate work with their hands. They often work with small, valuable objects, such as gold ring settings and diamonds.

- Do you enjoy doing detailed work such as embroidering or building models from kits?
- Do you have nimble fingers? Can you thread a needle quickly?

Jewelers work without supervision. They must be responsible and take pride in their work.

- Do you usually complete your homework assignments on time?
- Are you one of the "workers" when you are on a school committee?
- Do you work on a project for one of your classes in school until it's just right?
- Do you stick with an activity such as building a model until it's done as well as you can do it?

Exploring Careers

Suggested Activities

Use jewelry and jewelry making as topics for school assignments. Write about jewelry styles during different periods of history for an English or a social studies report. Design or make jewelry for an art class. Explain or demonstrate how jewelry is electroplated for a science class. For a mathematics class, prepare a report on the systems of measurements used by jewelers—karats and troy weight for gems and carats for precious metals. Your library has books that will help you with these projects.

Visit exhibits of jewelry in museums, shopping malls, and craft fairs. Look for an opportunity to talk with goldsmiths, silversmiths, enamelists, or other craftworkers who make jewelry or works of art from precious metals or stones. Ask about their work. How do they feel about it? How did they become interested in their craft? How did they learn their skills?

Arrange a class tour of a jewelry repair shop or a jewelry store that has a jeweler. If there is a jewelry factory in your area, try to arrange a class tour. You will see that the work in the jewelry factory is much more specialized than in a store or repair shop.

Make some jewelry. Learn what tools jewelers use; learn how they shape metal. You will find jewelry kits in hobby shops and department stores. These can help you learn basic manual skills. Look for kits that use metal or involve very detailed and delicate work. Other activities that will help you develop manual skills are model building and needlework.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops also may offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Ceramics and Pottery and Metal Arts.

If you are a Boy Scout, try for merit badges in Drafting, Leatherwork, Machinery, Metalwork, Model Design and Building, Pottery, or Sculpture.

Join a chapter of VICA (Vocational Industrial Clubs of America) if your school has one. VICA chapters plan projects, take field trips, and hold competitions in such skill areas as jewelry repair and watchmaking.

Write for information about the occupation to Retail Jewelers of America, Time-Life Building, Rockefeller Center, 1271 Avenue of the Americas, New York, New York 10020.

Related Occupations

Jewelers are not the only workers who make and repair metal products. Descriptions of seven such workers are listed below, along with the names of seven occupations. Try to match the workers with their job titles.

a. Automobile Body Repairer
b. Goldsmith
c. Machinist
d. Modelmaker
e. Silversmith
f. Tool Maker
g. Watch Repairer

1. Max uses hammers, torches, and crowbars to make accident cases look like new.

2. Neal makes parts for cars, ships, trains, and other machines. He uses lathes, milling machines, and other power tools and works with many different metals, including steel, iron, aluminum, and brass.

3. Hope makes metal samples that are used to mass-produce jewelry. She shapes metals such as brass just as a jeweler shapes gold, silver, or platinum.

4. Emily works from sketches and diagrams just like a jeweler. She makes the part of a lathe, milling machine, or other machine tool that cuts metal.

5. Phil uses a precious metal to make and repair jewelry, knives, forks, plates, and tea sets.

6. Karen specializes in making and repairing jewelry from one precious metal.

7. Because Larry often wears magnifying glasses on the job, many people think that he is a jeweler. Actually, he repairs one of the smallest and most commonly used machines.

See answers at end of chapter.

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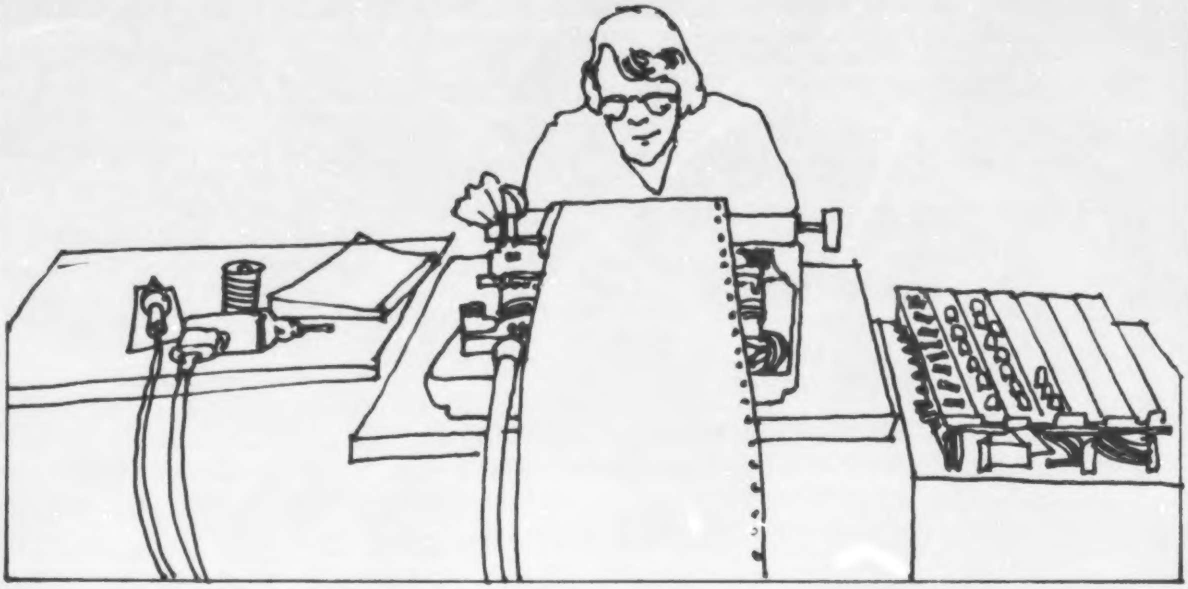
Job Facts



There isn't room in this book for a story about every kind of mechanic and repair occupation. However, you'll find some important facts about 28 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
TELEPHONE CRAFT OCCUPATIONS			
Central Office Craft Occupations	Central office craftworkers work for telephone companies throughout the country. Most central offices are in or near large cities.	Central office craftworkers usually begin working for the telephone company in other jobs. To become craftworkers they take classes at company schools and receive on-the-job training from experienced workers. Some craftworkers learn their skills in vocational schools or apprenticeships.	Central office craftworkers may have to work evenings, weekends, and holidays. They often work in teams.
Central Office Equipment Installers	Most installers work for companies that make central office equipment. Some work for telephone companies. Most central offices are in or near large cities.	Central office equipment installers are trained by the companies they work for. Usually they receive on-the-job training plus classroom instruction. Classes may be held at the factory where the equipment is made.	Some installers do a lot of travelling. They may be assigned to areas that include several States. Installers often work in teams.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Line Installers and Cable Splicers	Line installers and cable splicers work for telephone companies throughout the country.	Telephone companies usually provide both on-the-job training and classroom instruction. Some line installers and cable splicers learn their skills in vocational schools or apprenticeships.	Some line and cable work is strenuous. Workers have to climb poles and lift heavy cables and equipment.
Telephone and PBX Installers and Repairers	Telephone and PBX installers and repairers work for telephone companies throughout the country.	Installers and repairers usually begin working for the telephone company in other jobs. To become installers and repairers, they take classes at company schools and receive on-the-job training from experienced workers. Some installers and repairers learn their skills in vocational schools or apprenticeships.	PBX stands for Private Branch Exchange. Telephone and PBX installers and repairers do much of their work in customers' homes and offices. They travel in trucks equipped with tools and supplies. Sometimes they work outdoors.
OTHER OCCUPATIONS			
Air-Conditioning, Refrigeration, and Heating Mechanics	Most air-conditioning, refrigeration, and heating mechanics work for companies that sell and install cooling and heating equipment.	Most of these mechanics start as helpers and learn their skills by working with experienced mechanics for several years. Some learn through apprenticeships. Employers prefer to hire people with a high school education.	Air-conditioning, refrigeration, and heating mechanics often work long, irregular hours during peak seasons in the summer and winter.
Airplane Mechanics	Over one-half of all airplane mechanics work for the airlines. About one-third are employed by the Federal Government. The rest work for small repair shops or companies with their own planes.	Most airplane mechanics learn their trade in the Armed Forces or in trade schools certified by the Federal Aviation Administration (FAA). A high school diploma is preferred by employers. The majority of mechanics have FAA licenses. Applicants for licenses must have work experience and pass written and oral tests.	Aircraft mechanics often work in high places, such as on top of wings and fuselages of large jet planes.
Appliance Repairers	Most appliance repairers work for appliance stores and repair shops. Others work for appliance manufacturers, department stores, wholesalers, and utility companies.	Most appliance repairers start as helpers and learn their trade on the job. A high school education is preferred by employers.	Appliance repairers usually work with little or no direct supervision. Some spend several hours a day driving to job sites.
Automobile Body Repairers	Most automobile body repairers work for repair shops or for automobile and truck dealers. Some work for trucking companies, buslines, and motor vehicle manufacturers.	Most automobile body repairers start as helpers and learn their trade by working with experienced repairers for several years. Some learn through apprenticeships.	Automobile body repairers usually work with little or no direct supervision. The work often is dirty and strenuous. Repairers usually buy their own handtools.

Mechanics and Repairers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Automobile Mechanics	Most automobile mechanics work for automobile dealers, automobile repair shops, or gasoline service stations. Some mechanics work for government agencies and businesses that have their own automobile repair departments. Still others work for automobile manufacturers.	Automobile mechanics usually learn their skills on the job. Some mechanics learn through apprenticeships that combine classroom instruction and on-the-job training. Courses in automobile repair are helpful in getting a job. Mechanics must have a driver's license.	After they have worked for a while and mastered their skills, some automobile mechanics open their own repair shops or gasoline service stations. Mechanics often work over 40 hours a week. They usually buy their own handtools.
Boat-Engine Mechanics	Most boat-engine mechanics work for boat dealers or marinas. Some work for companies that manufacture boats.	Boat-engine mechanics usually learn on the job. They start as helpers and work under the supervision of experienced mechanics. Employers prefer to hire high school graduates.	Boat-engine mechanics often work overtime during the spring and summer. Mechanics may repair minibikes, motorcycles, snowmobiles, and lawnmowers.
Bowling-Pin-Machine Mechanics	Almost all bowling-pin-machine mechanics work in bowling centers. A few work for companies that manufacture automatic pinsetters.	Bowling-pin-machine mechanics learn on the job under the supervision of experienced workers.	In some bowling centers, mechanics do all the maintenance work such as polishing lanes and reconditioning pins.
Business Machine Repairers	Most business machine repairers work for companies that make such business machines as typewriters, postage meters, and photocopiers. Some repairers work directly for companies that use the machines.	Business machine repairers usually attend schools run by their employers. They learn on the job under the supervision of experienced workers. Employers require a high school diploma and prefer people who have had some technical training in machine repair.	Business machine repairers must keep customers satisfied. They have to be pleasant and cooperative and dress neatly. Training in electronics is becoming more important.
Computer Service Technicians	Most computer service technicians work for companies that repair computer equipment or for companies that make the equipment. Some technicians work for organizations that have large computer centers.	Computer service technicians usually attend company schools for several months and study computer theory, math, electronics, and other subjects. They also learn on the job under the supervision of experienced workers. Employers look for people with some post-high school technical training.	Computer service technicians cannot count on a 9-to-5 workday. They often are on call 24 hours a day or work shifts. They must dress neatly, be pleasant, and know how to deal with people.
Diesel Mechanics	Most diesel mechanics work for distributors and dealers of diesel equipment. Some work for trucking firms, buslines, independent repair shops, or diesel engine manufacturers.	Diesel mechanics usually train on the job under the supervision of experienced workers. Some mechanics learn their skills through apprenticeships or in vocational schools. Most employers prefer high school graduates.	Most jobs in the field are filled by mechanics who have experience repairing gasoline engines.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Electric Sign Repairers	Most electric sign repairers work in small shops that manufacture, install, and service electric signs.	Electric sign repairers usually start as helpers and learn their skills by working with experienced repairers. Some train through apprenticeships. A high school diploma is preferred by most employers and required for apprenticeships.	Electric sign repairers cannot be afraid of heights. They often work on ladders or in the baskets of boom trucks.
Farm Equipment Mechanics	Most farm equipment mechanics work in the service department of farm equipment dealers. Some work in independent repair shops or for large farms. They usually work in small towns or rural areas.	Farm equipment mechanics usually start as helpers and learn their trade by working with experienced repairers. Some train through apprenticeships or vocational schools. Most employers prefer high school graduates.	Farm equipment mechanics work long hours during planting and harvesting season—as much as 10 to 12 hours a day, 7 days a week. They often travel to the fields to repair broken equipment.
Industrial Machinery Repairers	Industrial machinery repairers work in manufacturing plants. They maintain and repair the machines used to make food products, chemicals, paper, and thousands of other products.	Most industrial machinery mechanics start as helpers and learn their trade by working with experienced repairers. Some train through apprenticeships. Most employers prefer high school graduates.	Industrial machinery mechanics may work nights and weekends. They have to be agile and in good physical condition in order to work with large machines.
Instrument Repairers	Most instrument repairers work for industrial firms or power companies. They maintain and repair the instruments used in producing chemicals or petroleum, for example. Some repairers work for companies that manufacture instruments. Some work for repair companies or for the Federal Government.	There are several ways of training for a job in this occupation. Instrument repairers often start work as production workers, then train on the job. Some train through apprenticeships. Technical schools, community or junior colleges, and the military also teach the skills needed to become an instrument repairer. A high school diploma is required.	Technical training following high school is increasingly important. Instrument repairers may work nights and weekends.
Jewelers	Most jewelers work in precious jewelry factories or jewelry repair shops. Some work in stores that sell jewelry. Most precious jewelry factories are in New York City.	Jewelers usually learn their skills by working under the supervision of experienced jewelers. Some train through apprenticeships or in vocational schools. Most employers prefer a high school education.	Once they have mastered the trade, many jewelers open their own jewelry repair shops.
Locksmiths	Most locksmiths work for locksmith shops or operate their own shops. Some work in hardware and department stores or in large industrial plants.	Beginners usually learn their trade by working with experienced locksmiths. Some train in vocational schools. A high school education is preferred by most employers. Many States and cities have licensing requirements.	Locksmiths may be on call and work nights and weekends. They spend several hours a day driving to job sites.

Mechanics and Repairers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Maintenance Electricians	More than half of all maintenance electricians work for manufacturing industries. Some are employed by public utilities, mines, railroads, and Federal, State, and local governments.	Most maintenance electricians learn their trade on the job as helpers or through apprenticeship. Some learn the trade in the Armed Forces. A high school diploma is required for an apprenticeship. Many local governments have licensing requirements.	Following safety principles is very important, because maintenance electricians work near high-voltage industrial equipment.
Motorcycle Mechanics	Most mechanics work for motorcycle dealers. Some are employed by city governments to repair police motorcycles.	Motorcycle mechanics usually start as helpers and learn their skills by working with experienced mechanics. Most employers prefer high school graduates. Mechanics must have a motorcycle driver's license.	Motorcycle mechanics often work overtime during the summer. Mechanics must buy their own handtools.
Piano and Organ Tuners and Repairers	Most work for repair shops or operate their own shops. Some repairers are employed by piano and organ dealers and manufacturers.	Piano and organ tuners and repairers usually start as helpers and learn their skills by working with experienced repairers. A small number of technical schools and colleges have courses in piano repair. Most employers prefer high school graduates.	Piano and organ tuners and repairers often work evenings and weekends. They are busiest during the fall and winter because people spend more time inside.
Shoe Repairers	Most shoe repairers work in repair shops. About half own their own shops. Some repairers are employed in shoe stores, department stores, and drycleaning shops.	Shoe repairers usually start as helpers and learn the trade by working with experienced repairers. Some train at vocational schools.	Self-employed shoe repairers work long hours—sometimes as much as 10 hours a day, 6 days a week.
Radio and Television Service Technicians	Most radio and television service technicians work in shops and stores that sell or service radios, television sets, and other electronic products.	Up to 2 years of technical training in electronics and 2 to 4 years of on-the-job experience usually are required to become a service technician. Technical training is available from high schools, vocational schools, and the Armed Forces. Many States require service technicians to have licenses.	Many radio and television service technicians open their own repair shops.
Truck Mechanics and Bus Mechanics	Most truck mechanics work for companies that own fleets of trucks. Others are employed by truck dealers, truck manufacturers, or Federal, State, and local governments. Most bus mechanics work for local transit companies or intercity buslines.	Most truck and bus mechanics start as helpers and learn the trade by working with experienced mechanics. Some mechanics train through apprenticeships. A high school education is preferred by most employers. Truck and bus mechanics may need a State chauffeur's license.	Truck and bus mechanics may work evenings, nights, and weekends. They occasionally make emergency repairs on the road.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Vending Machine Mechanics	Most vending machine mechanics work for companies that install and service vending machines. Some work for companies that own beverage machines, juke boxes, pinball machines, and laundry and drycleaning machines.	Vending machine mechanics usually start as helpers or route drivers. They learn their trade by working with experienced mechanics. A high school education is desirable. A driver's license is required.	Vending machine mechanics frequently work at night and on weekends and holidays.
Watch Repairers	Most watch repairers work in jewelry stores or repair shops. A small number work in watch factories.	Most watch repairers learn their skills in watch repair schools. Courses last from 1 to 3 years. Some watch repairers train through apprenticeship or on the job. A high school education is preferred by most employers and schools. Ten States require watch repairers to have a license.	Many watch repairers open their own shops.

Answers to Related Occupations

AUTO MECHANIC

1. Aircraft mechanic, 2. Bicycle repairer, 3. Boat engine mechanic, 4. Bus mechanic, 5. Diesel mechanic, 6. Farm equipment mechanic, 7. Motorcycle mechanic, 8. Small engine mechanic, 9. Truck mechanic.

COMPUTER SERVICE TECHNICIAN

1. Appliance repairer, 2. Automotive electrician, 3. Business machine mechanic, 4. Electronic organ technician, 5. Instrument repairer, 6. Radio repairer, 7. Radar repairer, 8. TV service technician.

JEWELER

1. Automobile body repairer, 2. Machinist, 3. Modelmaker, 4. Tool maker, 5. Silversmith, 6. Goldsmith, 7. Watch repairer.

In addition to his work at a children's hospital, this pediatrician teaches at a medical school.

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Exploring Careers

Luther Knight was nervous. The clock read 9:57, almost time for science class. That by itself didn't bother him; he enjoyed science. Occasionally Ms. Dombrowski talked too much and the students got fidgety. But Luther liked Ms. Dombrowski's course in general science, and the unit in biology they were doing now fascinated him. He planned to study biology in high school and then in college. And someday he would be a famous biologist. Every day he looked forward to science class.

Every day, that is, except today. Today Luther was nervous. Today he was scheduled to give a report to the class and very soon he would be standing at the front of the room and talking while 30 pairs of eyes watched him. Luther had prepared his report; he knew what to say. But the thought of all those eyes on him sent shivers up his spine.

Luther and his classmates sat down as the bell rang. A minute later, a woman entered the room. She moved quickly and gave an impression of barely contained energy. After dropping some papers on her desk, she went straight to the chalkboard and picked up a piece of chalk.

"Good morning, everyone," she began, getting straight to the point. "Monday, as you remember, we started talking about the science of health. Yesterday we got into the history of health care, and today we have individual reports on health occupations . . ." Ms. Dombrowski looked up. "I'm sure everyone is ready," she added with a wide smile.

Luther moved nervously in his seat as the teacher continued. "Before we hear the reports, though, let's review yesterday's discussion. What did we say about health care?"

Allison spoke up. "Caring for the sick is one of the world's oldest occupations. People have been doing it for thousands of years. But ways of taking care of the sick have changed a great deal. In the old days, health care was all mixed up with magic and superstition. Today, medicine is a science and medical researchers keep looking for better ways of treating illness and keeping people healthy.

"Many medical procedures, and many of the rules about good health that we take for granted, were discovered quite recently—after lots of scientific observation and research. Anesthetics to keep people from feeling pain and shots to protect them against diseases like smallpox or polio are such discoveries. *We* all know how important it is to keep wounds clean to prevent infection, but doctors didn't always know that. Centuries ago, operations took place in dirty surroundings; doctors didn't realize that the germs on a dirty scalpel might make a sick person even sicker.

"And," continued Allison, "new medical discoveries are taking place all the time. Some medicines and operations that are used today were unknown just 5 or 10 years ago!"

"Although the field of health care is very old," she said, speaking rapidly, "it's also very new. And advances in medical science are taking place so fast that the field is changing all the time."

"That's an excellent summary, Allison," said the teacher. "Now, what else can we say about health care? Why should we bother to learn about health occupations?"

Hesitating at first, Luis finally raised his hand. "Because some of us may want to become doctors and nurses when we're older," he said.

"Yes, of course, Luis," answered Ms. Dombrowski. "We've already learned that several million people in this country work in the health field, and that there are health careers of all kinds for people with different interests and abilities.

"Many of these jobs were created by the rapid developments in medicine that Allison just mentioned. Remember that many of the things that people in the health field do today would have been unimaginable 100 years ago. The health occupations as we know them today were "created" by such things as the invention of a new machine, the discovery of a new way of diagnosing illness, or the introduction of a better way of helping people take care of themselves. New occupations are emerging all the time, and quite possibly the health occupations of the future won't resemble the jobs we're going to hear about now."

Glancing at her paper again, the teacher continued. "We have eight reports to hear today, so let's go ahead with them. First is Toni Crowley, who will tell us about medical practitioners."

Medical Practitioners

Note cards in hand, Toni walked to the front of the room, faced the class, and began to speak.

"Medical practitioners, whom we usually refer to as doctors, are called that because they "practice" the profession of medicine. When they treat patients, their hardest and most important job is making a diagnosis—figuring out what's wrong and what to do about it. They usually start by taking a medical history and doing a physical examination, plus ordering whatever tests or X-rays seem appropriate. The results give them the clues they need to determine how sick someone really is. Coming up with the correct diagnosis can be hard if the patient is a baby who can't explain what hurts. Or if the disease is very rare, the kind doctors read about in textbooks but never expect to see. At any rate, diagnosing illness and prescribing the proper treatment take so much knowledge and skill that medical practitioners spend years and years going to school.

"Most medical practitioners are *physicians* and have a degree called a Doctor of Medicine, or M.D. Some physicians are *general practitioners*, doctors who see patients of all ages and treat all kinds of illnesses. But most physicians specialize. We're all familiar with some of these experts. On television we've seen *surgeons* operate. When our mothers were expecting us, they probably visited *gynecologists* or *obstetricians*. These doctors took care of problems related to the pregnancy, and delivered us when we were born. And many of us have visited *pediatricians*, doctors who treat children and youngsters. There are other specialists whom you may not have heard of. *Cardiologists*, for example, concentrate on diseases of the heart. *Neurologists* treat problems of the brain and nervous system. *Radiologists* specialize in using X-rays to find or treat illnesses. The list goes on and on. In fact, there are more than 30 fields of medicine in which doctors can take graduate training after they earn the M.D.

"There are other kinds of medical practitioners you've probably heard about. *Osteopathic physicians* help patients who have problems involving muscles and bones. They use hand manipulation as a form of treatment in addition to surgery, drugs, and other conventional medical treatments. *Chiropractors* deal with the nervous system, and treat patients by manipulating the spine. And *podiatrists* treat foot disease and deformities such as corns or bunions. They also take care of problems with the arch, or curve of the foot."

The diagnosis can be difficult if the patient can't explain what's wrong.

Surgeons must be able to make decisions in emergencies.

Toni looked up from her paper. "There are other kinds of health practitioners that I haven't mentioned," she said. "But they will be covered in other reports. Any questions?"

When no hands appeared, Toni returned to her seat. "That was very good, Toni," commented Ms. Dombrowski. "And now let's hear about another kind of health practitioner, the dental practitioner, or dentist. Sharon Dailey's report on dental occupations is next. Then Pilar Chavez will tell us about optical occupations. Sharon?"

As Sharon walked to the front of the room, Luther shifted in his seat. His ordeal was at least 10 minutes away. Maybe, if he was lucky, the other reports would take the whole hour and he'd be saved for today. But that was too much to hope for....

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Dentists need talented hands as well as scientific ability.

Helping people select frames for their eyeglasses takes courtesy and tact.

Dental Occupations

"Dental workers," began Sharon, "are concerned with the teeth and gums. Many of us have gone to the *dentist* to have a cavity filled. But dentists do much more than that. They give us advice on taking proper care of our teeth. They examine teeth and gums for signs of disease. Depending on the problem, they take X-rays, straighten teeth, and treat gum disease. When necessary, they pull teeth and substitute false teeth, called dentures. Some of us have visited an *orthodontist*—a dentist who specializes in straightening teeth.

"When you visit a dentist's office to have your teeth cleaned, it may not be the dentist who does the cleaning. Dentists often employ *dental hygienists* to clean and polish teeth, take X-rays, and tell patients how to care for their teeth properly. Many dentists also have a *dental assistant* who makes the patient comfortable in the dental chair and helps the dentist by handing instruments and keeping the patient's mouth clean.

"There is one other kind of dental worker whom we rarely see, the *dental laboratory technician.* This is the person who makes braces, dentures, crowns, and bridges. If you wear braces, you probably remember what it was like when the dentist took impressions and measurements of your teeth. The technician used these to make the braces. Are there any questions?"

Since there were no questions this time, either, Sharon gave the floor to Pilar and sat down. Luther couldn't keep his eyes off the clock on the wall.

Optical Occupations

"Look around the room," began Pilar, "and notice how many people wear glasses. Quite a few. And some of you wear contact lenses. Who told you that you needed glasses? An *optometrist,* probably. Optometrists are medical practitioners and have extensive training, as do the other doctors Toni just told us about. But instead of being Doctors of Medicine they go to colleges of optometry and earn the degree of Doctor of Optometry. Optometrists examine their patients' eyes and may prescribe glasses or contact lenses to correct poor vision. When necessary, they can suggest other treatments, such as eye drops, that don't involve drugs or surgery.

"Many optometrists employ an *optometric assistant* who helps them the way a dental assistant helps a dentist. Optometric assistants keep patients' records, make appointments, and do other office work. They also prepare a patient for an eye examination and help the optometrist perform it.

"When I was in fifth grade, the optometrist tested my vision and told me that I needed glasses. At the time, I never wondered where those glasses came from. But in doing the research for this report, I learned that an *ophthalmic laboratory technician* was the person who actually made my glasses. Sometimes these workers are called *optical mechanics*. Anyway, they start with a standard piece of glass, called a lens blank. Using precision tools, they grind and polish the blank until it fits the prescription. Then they mark and cut the lens to fit the frame.

"I remember the day my father and I picked up the glasses at the office of the *dispensing optician*. We had already been there once, to bring the optometrist's prescription and choose the frames. When the glasses were ready, they didn't fit comfortably. They felt funny on my nose and I didn't want to wear them. So the optician adjusted them for me. Besides fitting glasses, opticians help patients select frames. And they write up work orders that the technicians use to make glasses.

This surgical intensive care nurse has had to find her own way of dealing with serious illness and death.

"But what if you need more than just glasses? Fortunately, I don't. But many people have serious eye diseases that require medicine or surgery. These people go to an *ophthalmologist*. Also know as *oculists*, ophthalmologists are physicians—medical doctors who specialize in problems of the eye. Like other physicians, they are licensed to prescribe drugs or surgery to correct a problem."

Pilar looked around the room and asked for questions. Someone in the back had one. Luther didn't pay any attention; he was busy reading his report to himself, afraid he might be called next. His report was as good as the others, he told himself. There was nothing to be afraid of.... But everyone would be looking at him! What if he tripped as he walked to the front of the room?

"Thank you, Pilar," Ms. Dombrowski was saying. "Let's see, who's next?"

Luther crossed his fingers and held his breath.

"Greg Tanimoto has a report on nursing occupations," continued the teacher.

Luther relaxed. Greg was sure to give a long report; he always did.

Nursing Occupations

Standing confidently at the front of the room, Greg paused to get everyone's attention and then began to read from his note cards.

"When we think of health care," he said, "we think of nurses as well as doctors. We all know that nurses play a very important role in caring for the sick. However, there's more to nursing than that.

"Just think about Ms. O'Hare, the school nurse. Like many nurses, she devotes a lot of her time to health education—teaching us things about our eating, sleeping, and living habits that can make us healthier. She also gives us tips on how to keep from hurting ourselves."

"That's right! She talked to our gym class last week about the dangers of skateboarding," broke in Charlie.

"Yes," agreed Greg, a little startled by the interruption. Regaining his composure, he continued. "You may not know that people in several different jobs provide nursing care: Registered nurses, practical nurses, nursing aides, attendants, and orderlies. The differences among these workers boil down to training and responsibility. The more training you have, the more responsibility you can assume and the more decisions you can make about what kind of care the patient should have.

"In a hospital or nursing home, *registered nurses* su-

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pervise nursing care. They keep track of the patients' progress. They must know enough to be able to judge a patient's condition and tell if it is getting worse. If so, they must know exactly what action to take. Nurses see to it that the physician's orders are carried out and consult the physician when problems occur. But when emergencies arise, they may have to take charge and rely on their own training and experience to do the best thing for the patient.

"Training for this profession takes from 2 to 5 years, depending on the program. That's considerably more training than people in other nursing occupations have, so registered nurses often act as team leaders in providing patient care. With their extra training they have greater responsibility for the patient's health. They not only give shots, for example, but know what the medicine is for and what side effects it might have.

"*Practical nurses* help physicians and registered nurses by handling routine aspects of patient care. They take temperatures and blood pressures, change bandages or dressings, and give cetain medicines. Their training usually takes 1 year. Practical nurses must pass a special exam in order to use the title "licensed practical nurse" or LPN.

"*Nursing aides* also help with the daily routine in a hospital or a nursing home. They answer patients' bell calls, deliver messages, carry food trays into patients' rooms, and feed patients who are too sick to feed themselves. *Orderlies* and *attendants* escort patients to operating and examining rooms. These nursing occupations require the least training—from a few days to a few months—and that usually is provided on the job."

Greg looked up from his note cards. "That's it. Are there any questions?"

Somebody *please* ask a question, thought Luther as he counted the minutes remaining in this class period.

"I have a question," said Lisa. "You mentioned the school nurse and talked about nurses who work in hospitals. I have a cousin who works in the health unit at Consolidated Petroleum, so I know that nurses also work in business and industry. Do they work in other places, too?"

"Sure they do," said Charlie before Greg had a chance to reply. "They work in doctors' offices!"

"Right," agreed Greg. "And nurses work in other places that are a little less obvious. Many nurses and nursing aides work in nursing homes, rehabilitation centers, psychiatric hospitals, and mental health clincs. The atmosphere is different from that in general hospitals, which usually are pretty hectic places where the patients are extremely sick, but stay for only a short time. Patients in nursing homes and mental hospitals may stay for months or years. Progress can be very slow, and that requires a great deal of patience and encouragement from the nursing staff. These nurses must be good at dealing with people during a difficult period in their lives. They must be able to reach out and encourage people who feel sad and hopeless. In institutions where the patients need rehabilitation or long-term care, the human side of nursing is especially important. Sometimes a nurse is the patient's only friend.

"Community health nursing is something else you should know about," Greg continued. "*Public health nurses* run clinics that deal with health care needs in neighborhoods where people live—housing projects in rundown parts of the city, migrant labor camps, remote communities in the mountains or the desert. *Visiting nurses* care for people in their homes; often, their patients are elderly people who are too sick or weak to manage all by themselves. Visiting nurses usually travel by car and see many patients in the course of a day. They're on the go all the time, and no two days are alike. Community health nurses do other things, too. They organize neighborhood health programs and try to educate people about good health and sensible living habits. They may,

Visiting nurses are on the go all the time.

for example, help start a campaign to wipe out rats; bring in speakers to teach shoppers about the nutritional value of the food they buy; or teach youngsters about drug abuse."

Toni raised her hand. "When I was preparing my report, I came across the term "nurse practitioner." Can you explain that?"

Excellent, thought Luther. The more questions the better. Greg certainly was wound up about nursing!

"*Nurse practitioners,*" began Greg, "are registered nurses who have gone back to nursing school for advanced training that lasts 1 year or more. The additional skills they learn enable them to provide basic health care on their own. For example, some nurse practitioners run maternal health clinics—clinics for mothers and babies. They know all about common childhood complaints, and can handle ordinary illnesses so well that the mother doesn't have to take her baby to a physician. A few nurse practitioners have private practices—just as doctors and dentists do—and treat patients with routine health problems such as colds, sore throats, sprains, and broken bones. Nurse practitioners are trained to substitute for a physician in specific situations."

"Good job, Greg," said Ms. Dombrowski. "Now let's hear from Kevin about medical record occupations."

Medical Record Personnel

"Medical records are an important part of health care," Kevin began. "Medical records are nothing more than written information about patients, including their "medical histories"—what illnesses they have had and when, what doctors they visited, what treatment or drugs they've had, and so on. The records also contain X-ray reports, results of laboratory tests, and notes from doctors and nurses.

"Many people use this information. Of course, a doctor usually needs to know your medical history in order to treat you. But medical records serve other purposes, too. Researchers use them in looking for cures for diseases. National and State health agencies use them in developing public health programs. And insurance companies use them in setting rates for their policies.

"Medical recordkeeping is a complicated process because the information is so technical. To handle the job, hospitals and clinics employ several kinds of workers. *Medical record clerks* do the more routine tasks. They translate age and sex information into codes, for example, so that this information can be stored and easily retrieved when necessary. They also answer routine requests for files. *Medical record technicians* handle tasks that require more technical knowledge, such as reviewing records for internal consistency and cross-indexing medical information. In most hospitals, a *medical record administrator* directs the records department and trains the technicians and clerks. These workers don't take care of sick people the way doctors and nurses do, but they're health workers all the same. Are there any questions?"

Luther looked around the room hoping to see hands go up, but none did. He became nervous again as Kevin went back to his seat and Ms. Dombrowski looked at her list. Luther glanced at the clock. He was counting on the hour running out before his turn. Or would it be better just to get it over with and not worry anymore? No, giving the report tomorrow would be better than giving it today . . . .

"Ramon Ramirez, let's hear your report on therapy and rehabilitation occupations," the teacher said suddenly.

So far, so good, thought Luther.

Therapy and Rehabilitation Occupations

"Think about the handicapped students in our school," began Ramon. "Some have obvious disabilities, such as blindness or a withered arm. Others have problems that aren't noticeable right away, such as hearing difficulty. But whatever the problem, many of these students learned to cope with their handicap through therapy.

"Therapists and rehabilitation workers help people with handicaps learn to move around, communicate, and go through everyday activities as normally as possible. With therapists' help, more handicapped people than ever before are managing very well in schools just like this one, in college, and in the world of work.

A speech pathologist is helping this little girl overcome her hearing problems.

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"The largest group of therapists includes *speech pathologists*, who treat speaking problems, and *audiologists*, who work with hearing problems. Speech and hearing are very closely related, so a specialist in one field must know the other pretty well.

"I chose this topic for my report because of my cousin Maria," explained Ramon. "She was in a motorcycle accident last year and hurt her leg very badly. When she got out of the hospital, she couldn't use her leg at all—couldn't stand on it, or walk, or run. It was awful. But the *physical therapist* she saw every day helped Maria learn to use the muscles in her leg again. During her treatment sessions, she did exercises with special equipment and practiced "ordinary" things like climbing stairs. That wasn't an ordinary thing for her, I can tell you! It took a lot of determination on her part, and a lot of encouragement from the therapist, for her to get back the use of that leg. The therapist really inspired her when her spirits were low; I guess that's a very important part of the job.

"*Occupational therapists* also work with people who have trouble using their muscles. The difference is, while physical therapists help you use your muscles again, occupational therapists teach practical skills that make your life easier or make you feel good about yourself.

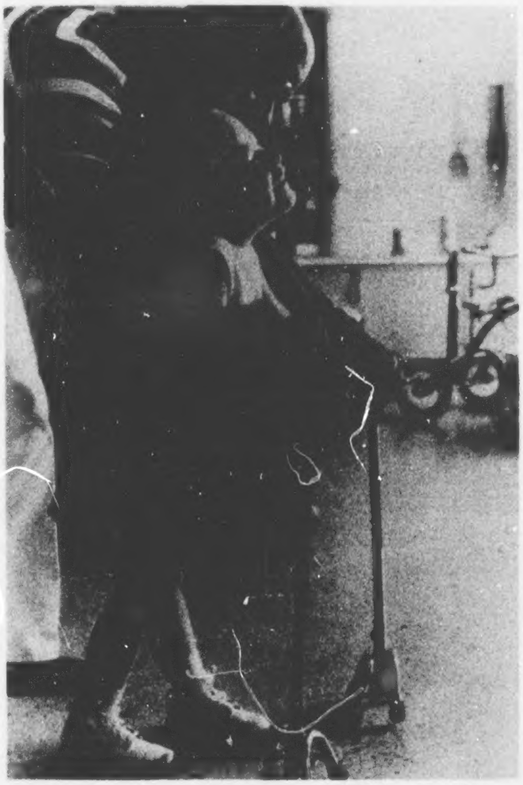
"I'll give you another example. When my grandmother had a stroke, she was paralyzed on one side and couldn't dress herself or eat without help. She even had trouble using the telephone. She was very upset about her condition because she hates to ask anybody to do things for her. But she's in a nursing home that has occupational therapy classes every day, and she is gradually learning to do simple things for herself again.

"Occupational therapists do a lot of their work with patients like my grandmother, people who need to relearn everyday skills because their muscles were damaged by illness or an accident. Some occupational therapists work with retarded or emotionally disturbed patients in mental hospitals. By teaching these patients simple skills like gardening or weaving, for example, they hope to give them self-confidence and help pave the way for emotional stability. And occupational therapists help mentally or physically handicapped persons prepare for a job by teaching them skills like typing or the use of power tools."

Ramon looked around for questions, but there were none. He took his seat while Ms. Dombrowski looked at her list.

"We have two reports left," said the teacher, "Which shall we hear first?"

Luther looked at the clock—only a few minutes left. If he wasn't called now, the hour would run out. He'd be saved until tomorrow.



Physical therapists encourage their patients to keep trying, even when progress is slow.

This occupational therapist knows that putting a mosaic together is good exercise for stiff fingers.

"Cathy Chan will tell us about medical technologists, technicians, and assistants," said Ms. Dombrowski finally. "And Luther Knight will be last with a report on other health occupations."

Bingo, said a voice in Luther's mind.

Medical Technologists, Technicians, and Assistants

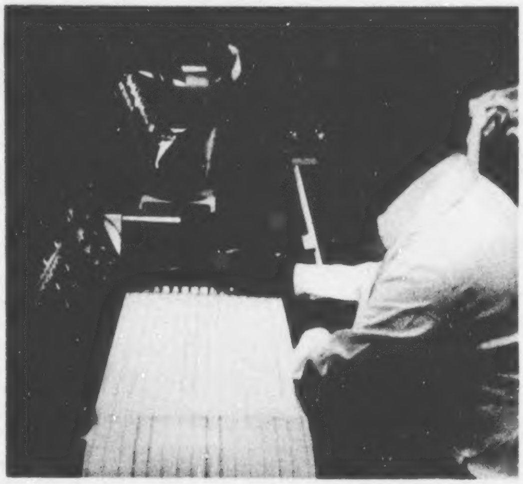
Cathy quickly took her place at the front of the room. After getting the attention of the class she started to read.

"There are many people besides doctors and nurses who help run a hospital or clinic. Among them are the technologists, technicians, and assistants. Some operate special kinds of equipment. The electrocardiograph, or EKG, for example, measures the rate and strength of a patient's heartbeat. It takes a specially trained *EKG technician* to operate it. Similarly, an *electroencephalographic technician* or *technologist* is needed to operate an electroencephalograph, or EEG. This machine records electrical impulses from a person's brain.

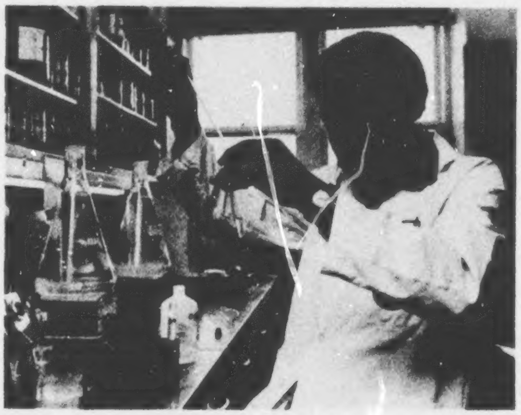
"For obvious reasons," Cathy said with a smile, "these workers usually are called *EEG technicians*. And next we come to the *radiologic technologist* who operates X-ray equipment."

Cathy paused to turn the page. At the same moment, a young man walked into the classroom. Luther thought he recognized him; he worked in the school office. Moving quietly along the wall so as not to disturb the class, he went up to Ms. Dombrowski and handed her a note. A minute later he was gone.

Cathy continued reading. "Other workers help in different ways. *Medical laboratory workers*, for example,


This technician operates machinery that records the electrical impulses in our brains.

Medical laboratory technicians perform tests that help physicians arrive at a correct diagnosis.


A patient's life might depend on this medical technologist's ability to work under pressure.

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Emergency medical technicians must act quickly when they arrive at the scene of an accident.

perform tests that help doctors understand and treat diseases. With microscopes and other equipment, the laboratory workers analyze samples of blood, tissue, and fluids from the human body.

"Surgeons receive important help from *operating room technicians* before, during, and after surgery. Technicians help set up the operating room with instruments, equipment, and linens. They also prepare patients for surgery by washing, shaving, and disinfecting the parts of the body where the surgeon will operate. During surgery they hand the surgeon instruments, sterile pads, and whatever else is needed. And after the operation they move the patient to the recovery room and help clean up.

"Other medical assistants, *respiratory therapy workers*, treat patients who have breathing problems. Also known as *inhalation therapy workers*, they give emergency treatment in cases of heart failure, stroke, drowning, and shock. This treatment is very important to prevent brain damage when a patient stops breathing. Generally, damage to a person's brain occurs if the person has stopped breathing for 3 to 5 minutes. And after 9 minutes without oxygen, a person usually dies. It's no wonder that respiratory therapy workers are among the first medical specialists called for in an emergency.

"And speaking of emergencies, *emergency medical technicians*, or EMT's, specialize in handling them. They

Members of a health team are oblivious to the outside world when they are fighting to save a life.

are called when someone has an automobile accident or a heart attack. They determine how bad the victim's illness or injury is and what emergency medical care is needed. Depending on the case, the EMT's may have to restore a victim's breathing, stop a wound from bleeding, give first aid for poison, or help deliver a baby. Whatever the situation, though, EMT's must work quickly. Their emergency care often means the difference between life and death."

Cathy looked around the room. "Any questions about what I've said?" she asked. No hands appeared, but this time Luther didn't care. There was only a minute left in the period, not enough time for him to give his report. He smiled to himself.

"Very good, Cathy," said the teacher, walking to the front of the room. "That leaves us with Luther's report. Normally we wouldn't have time for it, but your schedule has been changed today. The school office tells me that your next-period teacher, Mr. Borden, suddenly got sick and went home. They don't have a substitute, so for the next period you'll be with me. We'll hear Luther's report, then take a break. After the break we'll discuss the reports. Luther?"

Luther groaned and stood up. Trying to avoid the others' eyes he walked stiffly to the front of the room. There he turned around, looked down, and began to read. His eyes never left the page.

This student nurse volunteers her time to teach senior citizens about nutrition.

Other Health Occupations

"There are several health occupations that don't fit into any of the other groups," he began nervously. "But they are important, too. Take *pharmacists*, for example. If you are sick, your doctor may suggest you take a certain drug. The doctor writes an order, or prescription, for the drug. When you go to the drugstore, a pharmacist fills that prescription by giving you the exact drug the doctor ordered. But pharmacists do more than just putting pills in a bottle. They test each drug to see how strong and fresh it is. They must know what goes into each drug, how it is used, and what effect it has. And they give doctors advice on choosing and using drugs properly.

"Another important person is the *dietitian*. As you can tell from the word itself, dietitians are experts in diet or nutrition. They help plan meals for patients in hospitals and clinics. Since doctors sometimes prescribe certain foods for their patients, dietitians in a hospital may have to plan hundreds of individualized meals every day. Of course, not all dietitians work in hospitals. Many work in nursing homes, large companies, and schools like ours. And some work in neighborhood health centers, organizing programs to teach people about nutrition, meal planning, and the importance of good eating habits."

Luther turned the page without looking up. "But let's go back to the hospital for a moment," he continued. "We've heard about many of the people who work there: Nurses, doctors, laboratory workers, technicians, dietitians, and so on. It's clear that a hospital needs some people to coordinate the activities of all the others and make everything run smoothly. This is the job of *health administrators*. They supervise the operations of hospitals, nursing homes, and other health facilities. This job requires a great deal of business and organizational skill—the top administrator, after all, is responsible for keeping costs within a budget, hiring and training staff, and purchasing all the supplies. But health care is a very technical field. Moreover, it's one that's in the public eye and subject to lots of regulations. Administrators need to know about all the different aspects of providing and paying for health care in this country.

"There are many other important health occupations. Let me tell you about just a few of them. *Physician assistants*, sometimes called physician associates, perform many patient care tasks traditionally handled by doctors. They may do physical examinations, prescribe certain drugs, and advise patients about their health problems—all under the direct supervision of a physician. Their work frees doctors to devote their time to more complex diagnoses and treatments.

"*Health sciences librarians* do things that are done in

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any library. They order library materials and organize them as conveniently as possible for use by readers. But these librarians are different. They have a very specialized knowledge of books, journals, and reports in the field of medicine and health. Medical researchers, students, physicians and nurses, and many other health workers use their services.

"*Medical illustrators* are people with artistic talent as well as a strong science background. They create drawings, sculptures, and other art forms to illustrate medical and surgical procedures. Their work appears in books, films, exhibits, and on television, and is important for research and for teaching purposes.

"*Biomedical engineers* use their knowledge of chemistry, physics, engineering, and other fields to design medical equipment such as cardiac pacemakers, heart-lung machines, artificial kidneys, and electroencephalograph machines. *Biomedical equipment technicians* install and repair such equipment.

"There's one last occupation I want to mention. All along we've talked about health care for people. But if your dog or cat got sick, what kind of doctor would you visit? A *veterinarian*, of course. Many veterinarians treat only small animals and pets. Others specialize in farm animals. Still others inspect meat for public health agencies or do research. Whatever they do, though, their work is very important because animal diseases can spread to people—and because animals have value in themselves."

Experience working with animals can help you decide about a career as a veterinarian.

There was nothing more on the page to read, so Luther looked up. Everyone was staring at him. After a nervous silence, he remembered what came next. "Are there any questions?" he asked.

Nobody moved. Finally, the teacher ended the uncomfortable silence. "Thank you, Luther. That was very good. You may sit down now.

"All right, class, let's take a 5-minute break," continued Ms. Dombrowski. "Then we'll talk about these occupations some more."

What Makes a Good Health Worker?

After the break, Ms. Dombrowski led the class discussion. "We've just heard about dozens of different health careers," she began. "We were told what each worker does. Now let's see if we can figure out what kind of person is best suited for a job in this field. Does anyone have any ideas?"

Greg raised his hand. "It seems to me," he said, "that the health field is so broad there is room for people with all kinds of interests."

"That's a very important point, Greg," said Ms. Dombrowski. "Jobs in this field aren't all alike. There are careers in health for people who enjoy running machines and handling equipment; for people who like to work with numbers or scientific data; for people who like to work with others; for people who are interested in business; and for people who are interested in consumer and public interest issues."

Toni spoke up. "But people in many of the health occupations *do* have something in common. They're working in scientific surroundings: Collecting specimens of blood or tissue, for example; analyzing them; interpreting laboratory results; and making decisions on the basis of scientific data and research. It seems to me that you'd have to like science to observe very strict procedures, as a laboratory technician has to. Or to understand how the muscles in our body work, as a physical therapist must."

"Good point, Toni," said Ms. Dombrowski. "*Science and math* are important," she wrote on the chalkboard. "And the way you feel about your science courses in school may be a sign of whether or not you'd like a health career. Now what else?"

Luis had something to say. "The main thing about these occupations is liking people. That's what health care is really all about. If I'm a doctor, nurse, or whatever, I want to help my patients. That means more than examining them or giving them medicine. It also means

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putting them at ease and making them confident that I can help them. That confidence might make the difference in their recovery."

"Health workers should be *good at working with people*," Ms. Dombrowski wrote. "We often call that "having a good bedside manner." That's good, Luis. Does anyone have more to say about that?"

Saul had a comment. "Getting along with people is more than just being nice. Look at speech pathologists, for example. Often their patients are retarded or emotionally disturbed. Progress often comes slowly or not at all. These workers must have a *positive outlook* and be able to inspire their patients to keep trying."

"You're right, Saul," said the teacher. "What else?"

The next hand in the air was Kevin's. "Liking people is important in some of the occupations," he said, "but not in all of them. Look at the medical record personnel, for example. They work with the patients' files. Or the laboratory workers, who test blood and tissue samples. Or the dental lab technicians, who make dentures. These workers never see the patients. So while many workers must have a good bedside manner, not all of them do."

"That's a good point, Kevin," said the teacher. "You don't have to be warm and outgoing for all of these jobs. And just because you can't stand the sight of blood doesn't mean you should rule out the health field either! Now what other qualities are important?"

Jessica spoke up. "My cousin is a physician, and she talks about how much *motivation* the job takes. It's more than just patience or compassion; it's the ability to keep yourself going when you want to give up. My cousin had years of hard training that left her little time for other things. And even now, as a doctor, her work still cuts into her private life. She never would have made it if practicing medicine hadn't been so important to her." Jessica paused and thought about it. Then she added, "I guess nurses, emergency medical technicians, and many other health workers need the same kind of motivation. They have to get through difficult training, or work long hours, or do some work that is very unappealing. It helps if they consider their work important."

"I think that's true, Jessica," answered the teacher. "Feeling that their work is important may not be the only reason they do what they do, but it is a big part. Does anyone else have a suggestion?"

This time no hands appeared. "Well, let me make a couple," continued Ms. Dombrowski. "Health practitioners, dental workers, nurses, technicians, and others perform many detailed tasks with their hands. These workers must have *good manual dexterity*, which means the ability to work well with their hands. Not everyone has that quality.

"One other characteristic we should mention is the *ability to work under pressure*. Surgeons and emergency medical technicians, to name only two, often have to think and act quickly to save a patient. They can't let the pressure make them upset or careless.

"Does anyone have anything to add to the list? No? Well, I think we've covered the most important qualities of good health workers. And since you've all contributed

Emergencies require expert medical teamwork.

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so much today, you deserve a rest. You may use the remainder of the period as you wish."

Training

No matter how much or how little time you're willing to put into training after high school, there may be a health career for you. You could start working as a hospital orderly without finishing high school; you'd receive your training on the job. Before becoming a physician, however, you'd have to train for 10 years or more after high school graduation. Those are the extremes. The training required for each of 32 health occupations is described in the Job Facts at the end of this chapter.

While formal training for a health career may be several years away, there are things you can do now to explore your interest in the field.

Science is very important in many of these occupations, and high school courses in biology, chemistry, physics, and mathematics provide the foundation you'll need for the science courses you'll take later on. Science fairs give you an opportunity to do projects on medicine and health.

Join a Health Careers Club if there is one in your school. The school nurse or science teacher often is the sponsor, and club activities may feature films, speakers, hospital tours, and other ways of providing information about health careers.

Volunteer to work in a health setting. Many hospitals have "candy striper" programs open to both boys and girls. The American National Red Cross provides a variety of volunteer opportunities for youngsters. Positions for Red Cross youth volunteers are available in nursing homes, day care centers, day camps, bloodmobiles, and in programs for the handicapped. Organizations concerned with diseases or health problems such as heart disease or cancer use volunteers to assist in their public education efforts. Working in such volunteer positions will acquaint you with what goes on in a health care setting.

It takes years of rigorous training to become a physician.

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Registered Nurse

Kathy Wright works in an intensive care unit where she takes care of patients who are in serious condition following surgery.

Exploring Careers

Kathy Wright is a nurse at Leeds Memorial Hospital. She works in the surgical intensive care unit and takes care of patients who are in serious condition following surgery. Most patients go back to their rooms after an operation. But not all of them. Kathy's patients are in such critical condition that they are in a special unit where they can be watched every minute for changes that could mean life or death.

To provide the 24-hour care so necessary for these patients, the nurses at Leeds Memorial work day, evening, or night shifts of 8 hours each. The shifts rotate, so that Kathy and the other nurses in surgical intensive care take turns on each of the three shifts. This week Kathy is working from 7 a.m. to 3 p.m.

Kathy grew up in a household where medical research and hospital gossip were ordinary topics of dinner table conversation. Her father is a sales representative for a drug company, and her mother is a pediatrician. As a girl, she heard enough about the "real world" of medicine and nursing to dispel any romantic notions that she might have picked up from novels or from television. Listening to the adults talk about their work, Kathy soon came to realize that a professional health career means lots of work and responsibility.

To become a registered nurse (RN), Kathy completed a 5-year program at a university that led to a degree of B.S. in nursing. As a student nurse, she had a heavy dose of science courses, including chemistry, anatomy, microbiology, physiology, nutrition, and public health. Clinical practice—working in the university hospital under the close supervision of the nursing instructor—was another important part of her training.

After graduation, Kathy took the State board examination for licensure. In New York, as in all States, nurses must have a license. Just as a driver's license is proof that you know how to drive, the license required to practice nursing, medicine, dentistry, dental hygiene, or pharmacy, for example, shows that you know enough about your profession to provide safe and proper care.

Kathy chose the B.S. program in nursing because she wanted to keep her options open. She knew, from her talks with her mother, that advancement opportunities for nurses were best for those with a bachelor's degree. And she felt that, after several years of bedside nursing, she might want to move into another kind of job.

At this point, just a few years out of nursing school, she thinks she'll probably stay in hospital nursing. Still, from time to time Kathy thinks seriously about making a change. She wonders what it would be like to fulfill her youthful dream of nursing needy people abroad as a Peace Corps volunteer or a Medico nurse. She also thinks about returning to nursing school for the master's degree or Ph. D. she would need to teach or do research.

The bachelor's degree program that Kathy completed isn't the only way to become a nurse. Hospitals offer 3-year diploma programs and community and junior colleges offer 2-year associate degree programs. However, the bachelor's degree program in nursing generally opens more doors than either of the other two. It's important to look into all three ways of preparing for a nursing career.

Kathy gets off the elevator at the third floor, walks through the heavy double doors, and stops at the nurses' station. There she spends few minutes with Mr. Cochrane and Ms. Wall, the two nurses who have been on duty all night. It is customary for the nurses going off duty to give a general report to the incoming nurses. The group is joined by Ms. Rubel, the nurse who will be on the day shift with Kathy this week.

Ms. Wall begins talking to Kathy about the patients they "share." "Mr. Young needed medication for pain at 2 o'clock," she explains, "and Ms. Lance's temperature rose to 102 degrees around midnight, but went down shortly thereafter. Otherwise, their vital signs were normal. Ms. Vaughn slept very well. Ms. Lance is scheduled to be discharged from intensive care tomorrow."

"Fine," replies Kathy. "See you tomorrow."

The nurses in the surgical intensive care unit at Leeds Memorial practice primary nursing. This means that each nurse is responsible on a 24-hour-a-day basis for the continuity, planning, and evaluation of nursing care for one to three patients. Currently, Kathy is responsible for Mr. Young, Ms. Lance, and Ms. Vaughn, while Ms. Rubel is responsible for two other patients. Nurses may act as associate nurses to patients during the absence of their primary nurse.

Kathy enters Mr. Young's room. Mr. Young is recovering from open heart surgery. She checks his vital signs: Blood pressure, pulse, temperature, and respiratory rate. All appear normal. Then she checks his skin color, and afterwards sees to it that he is comfortable. Kathy records the information on his chart for the doctors who will be by later on. She looks carefully at the tube inserted in his chest to drain blood and restore pressure around the lung after the open heart surgery. Everything is as it should be.

She also checks a tube inserted into the bladder to drain urine into a plastic bag. Kathy removes the bag, measures the amount drained, records this measurement, and replaces the bag. Kathy then examines the tubing inserted in a vein in Mr. Young's left arm to feed him while he is unable to eat. Kathy makes sure that the fluid is flowing smoothly into his blood stream, then looks to see if there is enough fluid in the bottle suspended from a floor stand next to the bed.

Kathy checks patients' vital signs regularly. Sometimes she must change dressings. When he was first admitted to the intensive care unit, Mr. Young was so weak he couldn't even breathe without help. He needed a respirator—a machine that breathed for him mechanically. Now that he's breathing on his own again—a good sign—Kathy checks often to make sure that Mr. Young is coughing and doing deep breathing to help clear his lungs.

Next, Kathy goes to see Ms. Lance, a young woman who underwent surgery a few days ago. Her doctors had ordered surgery because they suspected lung cancer, but when they tested the tissue they removed during the operation, they found that the tumor in her lung was not cancerous after all. Mr. Lance was overjoyed to learn his wife didn't have cancer; her children are too young to understand what all the fuss is about. Kathy bends over to listen to Ms. Lance's chest and lungs, checks for signs of infection, and changes her dressing. Everything is satisfactory. Since Ms. Lance is scheduled to be transferred to another part of the hospital tomorrow, Kathy discusses the details of her transfer with her and tells her what to expect.

"I observe every little thing about my patient's condition—and I have to understand what I see," emphasizes Kathy.

Kathy visits her third primary patient, Ms. Vaughn, who is recovering from surgery to repair a large aneurysm in her abdomen. An aneurysm is an expansion in one of the arteries caused by a weakening in the arterial wall. If the artery were to burst, the patient could die from internal bleeding. Fortunately, the surgeon repaired Ms. Vaughn's aneurysm in time. Ms. Vaughn is dozing but wakes up as she hears Kathy approaching her bed.

"Hello, Ms. Vaughn, how do you feel today?"

Ms. Vaughn doesn't reply, just points to her stomach to show that she is in great pain. Kathy gives her some medication and tells her to wait until the pain eases to do her coughing and deep breathing exercises. While Kathy is bathing Ms. Vaughn and making her comfortable in bed, Dr. Church enters the room. Kathy tells him about the severe pain. She also says that Ms. Vaughn's lungs sound clear and that she has bowel sounds, and suggests that Ms. Vaughn might be fed orally instead of intravenously. After further examination, Dr. Church agrees, orders the intravenous tube removed, and writes a prescription for a stronger medication for pain.

The remainder of the day goes smoothly. Just before lunch, Kathy receives a message to call Mrs. Young, the worried wife of her open heart patient. Kathy makes the phone call and reassures Mrs. Young. "Your husband is getting along nicely. He needed medication for pain last night, but he rested well and is making good progress. I looked in on him early this morning."

Mrs. Young thanks Kathy and adds, "I'll be around to see my husband this afternoon after work." In intensive care, only family members may visit and only for short periods of time.

At 3 o'clock, Kathy and Ms. Rubel meet the incoming nurses and give their report. "No emergencies, no unusual circumstances," comments Kathy.

"This is the first time in weeks that there have been no major problems in the unit," puts in Ms. Rubel. "I can't quite believe it."

Kathy can't believe it, either. She can, however, recall the many times when she has placed an emergency call to the resident or intern on duty. Emergencies always take a lot out of her, although it doesn't show. Kathy responds cooly to the tense, highly charged atmosphere of a crisis in the intensive care unit; she moves quickly and does what has to be done. She likes being part of an efficient health care team and she also likes being in a large hospital that has very sophisticated medical equipment and technology. In an emergency, Kathy handles her share of the work as smoothly as if she were a machine herself. Her years of training show. But afterwards, when the crisis is past, she unwinds.

Sometimes, despite the efforts of the doctors and nurses, a patient dies. That's hard on everyone. And Kathy, like everyone else in the unit, has had to find her own way of coming to grips with the sorrow of serious illness and the reality of death.

"I guess I will remain in medical-surgical nursing after all," muses Kathy as she walks through the parking lot toward her car. "After all," she continues, "although quiet days like this one are nice for a change, I really like the pressure of working in the intensive care unit. And I like the fact that the job is so exacting and precise. We really zero in on the patient's problem. I constantly observe every little thing about my patient's condition—and I have to understand what I see. If the patient's breathing or heart rhythm changes, it's up to me to know what that might mean and to make a decision about what to do next... Yes, hospital nursing seems right for me."

After a crisis, Kathy takes time to unwind.

Exploring

Nurses must be concerned about good health.

- Do you eat a well-balanced diet?
- Do you get enough sleep?
- Do you see the dentist regularly?
- Do you pay attention to warnings about alcohol, drug, or tobacco abuse?
- When you ask someone how he or she is feeling, are you really concerned or do you merely consider it a social custom?

Nurses must have an interest in science.

- Do you like science?
- Do you enjoy doing projects for a science class or science fair?
- Do you read articles about science in magazines or the newspaper?
- Do you like to visit museum exhibits on science and technology?
- Do you enjoy watching medical programs on television?

Nurses must be able to tolerate unpleasant sights and sounds.

- Does the sight of blood upset you?
- Do you look the other way when you pass the scene of an automobile accident?
- Does it bother you to change a diaper?
- Do you feel uneasy about going with an injured friend to the emergency room of a hospital?
- Do the sights and smells bother you when you visit people in a hospital or nursing home?
- Does the idea of dissecting a frog in a science class bother you?

Nurses must be very observant. They must recognize danger signals right away.

- Can you tell when your pet isn't feeling well?
- Can you tell when you have had too much sun?
- Can you tell when you should take a break from a baseball game or other athletic activity?

- Can you tell when a car needs a tune-up?
- Do you notice minor changes in television or radio reception?
- Do you notice it when a movie reel is changed?
- Can you tell when something is missing from your room?

Nurses must carry out instructions precisely. There's no room for error when they give measured doses of medicine to patients.

- Are you good at following written instructions for assembling things?
- Can you remember road directions when someone gives them to you over the phone?
- Do you remember jokes and anecdotes?
- Can you memorize plays and coaches' instructions in football, basketball, and other sports?
- Can you remember a teacher's exact instructions for a homework assignment or a test?

Nurses should care about people. They deal with patients who often are at their worst during an illness or accident.

- Do you put up with friends even when they are grouchy?
- Do you mind hearing people complain?
- Do you visit relatives or neighbors when they are sick?
- Are you patient with your younger brothers or sisters when they are tired or irritable?

Nurses must stay calm during emergencies. A nurse might have to set up an oxygen tent, administer artificial respiration, or treat a patient having a heart attack.

- Could you keep calm and get help right away if your kitchen caught fire?
- Would you know what to do if an infant got hurt or stopped breathing while you were babysitting?
- Would you act sensibly if a pet were injured?
- Would you know what to do if a friend injured himself or herself on the playground?

As members of a health team, nurses must be good at giving and taking instructions and also must understand the limits of their authority.

- Can you give orders to your younger brothers and sisters?
- Do people do what you ask without getting angry?
- Do you recognize the need for laws, even those dealing with relatively minor offenses such as littering or jaywalking?
- Can you judge how far you can go when arguing with a teacher over a grade?

Nurses must have stamina. They spend a lot of time on their feet.

- Do you like to be active most of the time?
- Do you enjoy activities such as sports, hiking, backpacking, dancing, or gardening?

Nurses must keep accurate records of patients' medication, blood pressure, temperature, and so forth.

- Do you keep good records when you're a club treasurer or secretary?
- Do people ask you to keep score in bowling and other activities?
- Are you good at taking the minutes at meetings?
- Are you conscientious when you take notes in class?

Nurses must have manual dexterity to handle patients and medical equipment.

- Do you like working with your hands?
- Are you accustomed to using tools for work around the house?
- Are you good at setting up displays for class projects or school exhibits?

Nurses cannot afford to become emotionally involved with their patients.

- Can you remain calm when a friend or relative tells you about a serious problem?
- Does it upset you to visit someone who is very sick?
- Can you comfort a friend or family member during a time of sorrow?
- Can you argue a point calmly in a heated discussion?

Nurses keep up with the field by reading professional literature and attending lectures and conferences.

- Do you like to read for pleasure?
- Do you like to read popular science magazines?
- Do you show initiative in doing research on subjects of personal interest?
- When you are curious about something, do you go to an encyclopedia or library to learn more about it?
- Do you look up words you don't understand in the dictionary?
- Do you like to browse in the "new books" section of your library?

Exploring Careers

Suggested Activities

Volunteer to work in a hospital, nursing home, or clinic in your community. Volunteers typically provide entertainment; deliver mail and flowers to patients; write letters for patients and read to them; visit patients to cheer them up; run errands; direct visitors; conduct play activities for children; and provide babysitting services for visitors. They also do clerical jobs such as typing, filing, and stuffing envelopes.

Get in touch with the American National Red Cross about opportunities to work as a youth volunteer. Red Cross youth volunteers serve as tutors for younger children and as aides in hospitals, day care centers, and nursing homes; recruit blood donors; help with programs to combat drug abuse among young people; and play and study with homebound and handicapped children.

Contact the Boys' Club or Girls' Club in your community. Clubs offer a wide variety of programs including volunteer service at hospitals and work with retarded and handicapped children.

Babysit for a younger brother or sister. Take care of a neighbor's child. How does it feel to have someone depend on you?

Care for neighbors' pets when the owners go away. You'll have the experience of being responsible for an animal's basic needs.

Ask your teacher to arrange a class tour of a hospital or nursing home.

Invite one or more nurses to speak to your class about their jobs. Ask the speakers to discuss their duties, their training, and the rewards and frustrations of nursing. If possible, arrange for a panel discussion by nurses in several different specialties: A school nurse, a psychiatric nurse, a public health nurse, and an emergency room nurse, for example.

Contact your local chapter of the American National Red Cross to arrange a demonstration, talk, or movie on first aid for your science or health class.

Take a course in first aid from a certified instructor. First-aid courses teach you how to prevent accidents; how to protect accident victims; how to give emergency care for severe bleeding, stoppage of breathing, or oral poisoning; and how to take care of minor injuries.

Ask the school nurse to teach you how to take someone's pulse, blood pressure, and temperature.

Join a Science Club or a Health Careers Club if there is one in your school.

Use nursing as a topic for class assignments. Read a biography of Florence Nightingale for a book report in an English class. Prepare a report on the history of nursing for a social studies class. Explore an issue in public health, such as pollution, smoking, or drug abuse, for a science or health class. Choose a topic in biology or medicine for a science fair project. Report on metric measurements in the health field for a mathematics class.

Use first aid as a topic for a report in a science or health class.

- Describe what should be done for severe bleeding. When should a tourniquet be used?
- Explain the dangers of moving a seriously injured person. Tell how you would decide what method to use. Demonstrate a chair carry and a two-person carry. Show how to improvise and use a stretcher.
- Demonstrate how to apply an adhesive bandage, a large gauze compress held in place by tape, a dressing on the eye with a cravat, and a roller bandage on the ankle and foot, wrist and hand, forearm, and finger.
- Explain how to recognize and treat unconsciousness, shock, convulsions, poisoning by mouth, burns, and injuries to joints.
- Explain the objectives of artificial respiration. Demonstrate mouth-to-mouth and mouth-to-nose rescue breathing as well as the chest-pressure arm-lift and back-pressure arm-lift.
- Explain cardiopulmonary resuscitation (CPR).

Take a course in lifesaving from a certified organization. The Red Cross and the Boy Scouts of America both offer courses in Junior Lifesaving.

Join an Explorer Post if there is one in your area. Exploring, open to young men and women aged 14 through 20, offers programs in nursing, medicine and health careers, physical or natural science, child care, and emergency first aid. To find out about Explorer posts in your community, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, earn a merit badge in Public Health, First Aid, General Science, Lifesaving, or Emergency Preparedness.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops also sponsor service aide and community

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action projects in the health field, and offer proficiency badges in First Aid, Nursing, Lifesaving, Public Health, and Science.

Write for career information to the National League for Nursing, Career Information Services, 10 Columbus Circle, New York, New York 10019, and to the Veterans Administration, Department of Medicine and Surgery, 810 Vermont Avenue, N.W., Washington, D.C. 20420.

Related Occupations

Registered nurses work in many different settings. Some of these are listed below. Choose the statement that applies to each nurse's specialty.

1. **School nurse**
   a. Finds cures for contagious diseases peculiar to children
   b. Gives immunizations and maintains students' health records
   c. Teaches in a school of nursing

2. **Public health nurse**
   a. Prescribes medication for acne
   b. Writes advertisements for drug companies
   c. Teaches neighborhood residents about nutrition, hygiene, and other aspects of good health

3. **Nurse-midwife**
   a. Works under the supervision of a cardiologist
   b. Delivers babies and teaches new mothers sound health practices
   c. Trains ambulance personnel

4. **Nurse anesthetist**
   a. Administers drugs so that patients don't feel pain during operations or childbirth
   b. Examines ears, nose, and throat for signs of disease
   c. Develops vaccines for protection against disease

5. **Office nurse**
   a. Prepares a physician's patients for examination and provides whatever help the physician needs
   b. Gives first aid to office employees
   c. Tests for the presence of bacteria in a community's water supply

6. **Private duty nurse**
   a. Plans nutritious meals for hospital patients
   b. Provides nursing care, for a fee, in the patient's home or in a hospital or nursing home
   c. Operates an artificial kidney machine

7. **Occupational health or industrial nurse**
   a. Teaches blind patients new job skills
   b. Directs research to protect industrial workers from radiation hazards
   c. Treats employees and customers who become ill or have an accident in a department store, factory, or other business firm

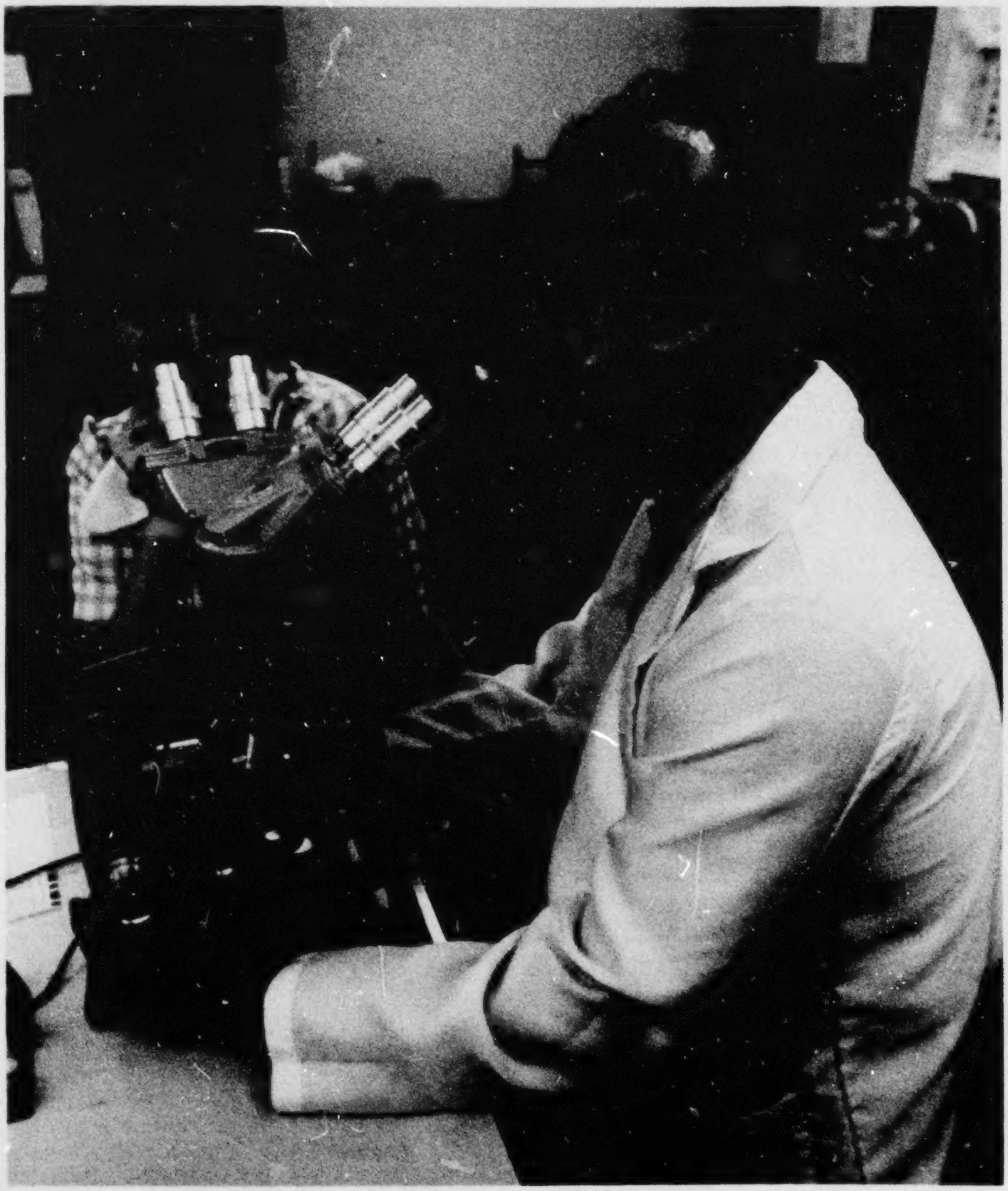
8. **Psychiatric nurse**
   a. Studies effects of high-altitude flying on airplane pilots
   b. Cares for patients who are mentally ill
   c. Performs brain surgery

9. **Rehabilitation nurse**
   a. Cares for patients who have chronic or disabling conditions, conditions that can't be cured quickly—if ever
   b. Converts old buildings into nursing homes
   c. Estimates future hospital costs for insurance companies

10. **Consultant nurse**
    a. Organizes volunteer services in a hospital or nursing home
    b. Sells drugs to hospitals
    c. Advises hospitals and nursing homes on ways to improve their nursing care

See answers at end of chapter.

Medical Technologist



Roberto Torres' interest in science led to a career as a medical technologist.

Health Occupations

I'm Roberto Torres, a medical technologist at St. John's Hospital. In the medical laboratory where I work, we do tests to find out exactly what's wrong with people who are sick. Doctors need to know what the problem is in order to take care of it.

Our medical laboratory is divided into four departments: Clinical chemistry, bacteriology, hematology, and the blood bank. I'm in bacteriology, or microbiology—have been ever since I started work here at St. John's. My training covered the other areas, though, and chances are that sooner or later I'll be in hematology or one of the other departments of the lab.

I became interested in chemistry during my freshman year in college. I did so well in it that Professor Reiber encouraged me to consider a career in science. Following his suggestion, I visited the Kroner Laboratories and talked to some of the people who worked there. One thing led to another and I decided to become a medical technologist. My college offered a B.S. in medical technology and that's the degree I have.

During my senior year in college, I worked at City Hospital, rotating among the various departments of the medical laboratory. Clinical rotations give you a chance to put your classroom knowledge to work in a real life situation. They're part of the training for just about every health occupation, I guess. After I graduated, I took a special exam and when I passed I was officially "registered" as a medical technologist. Exams, certification, registration—it's a way of protecting the public and you find it in most health careers. But from my point of view, registration helps in getting a job and, sometimes, a higher salary. All the medical technologists at St. John's are registered.

A pathologist is in charge of the medical laboratory here. He's a physician, of course, one who has spent years studying the ways in which disease shows up in the tissues and fluids of our bodies. More people work in a medical laboratory than you might think. St. John's isn't a huge hospital, yet there are about 70 people working in the medical laboratory here. In addition to medical technologists like myself, there are technicians and assistants who take care of the more routine kinds of lab work. They didn't have to take as much training as I did, just 1 or 2 years in most cases.

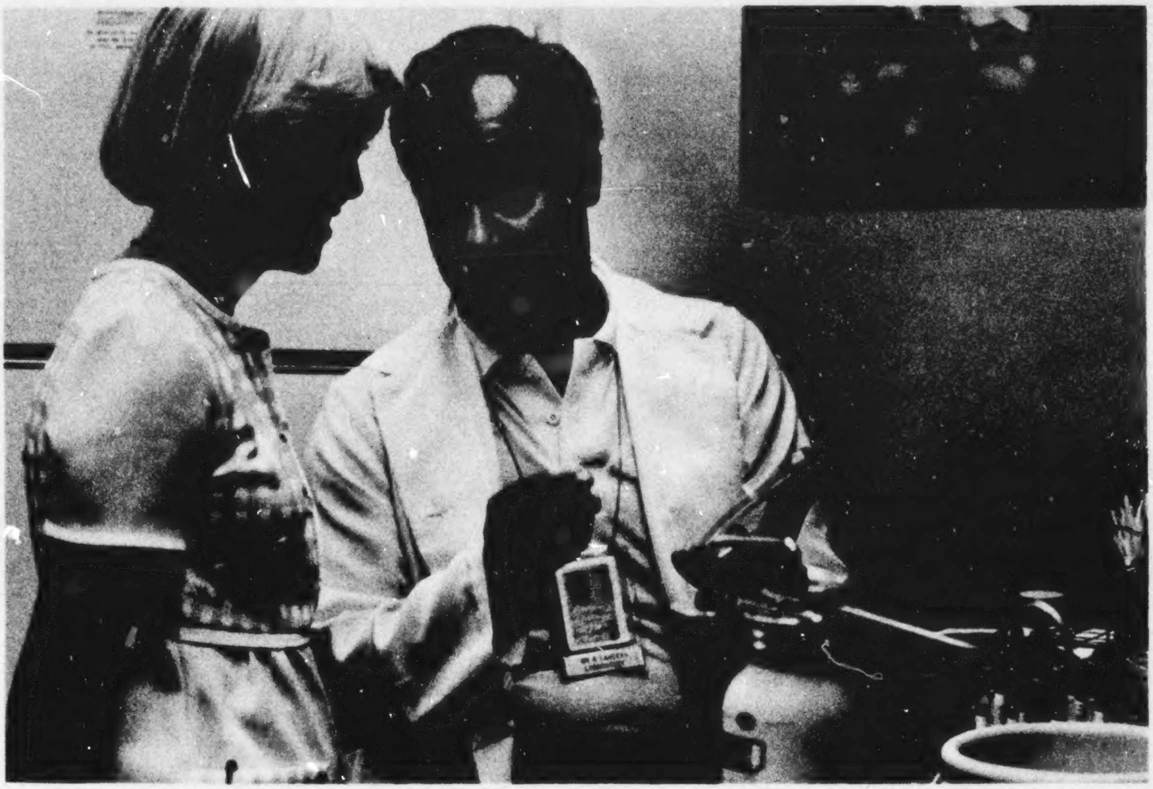
Yesterday was a fairly typical day in the bacteriology department. We had the usual sorts of things to test: Samples of urine, spinal fluid, throat cultures, material from wounds, and blood. Physicians have samples sent to bacteriology when they suspect an infection or a disease. I'll give you an example. One of the patients we're trying to help is a woman who's worried and upset because she's gradually losing the strength in her legs, and the doctors don't know why. They've tried lots of different tests, and yesterday she had an extremely painful one: The doctor used a long hypodermic needle to remove some fluid from her spinal canal. Now we're testing that fluid to see what it can "tell" us. If some of the cells are abnormal, we'll know she has a nerve disease, which could explain her weakness.

This morning, a throat culture came in to the lab. The doctor who sent it suspects an infection and wants to find out which antibiotic to prescribe for the patient's sore throat. An antibiotic is a chemical substance that destroys bacteria. But since there are so many kinds of bacteria that make people sick, and so many different antibiotics to combat them, the first step is to find out exactly what we're dealing with. That's where the lab comes in.

The culture arrived on a swab in a sterile tube. I placed some of it in a special dish containing nutrients that make bacteria grow, then put the dish in an incubator—a warm place where the bacteria probably will grow overnight. Tomorrow morning I'll try to identify the bacteria, using chemicals. I'll also make slides and examine them under a microscope. Then I'll experiment to find out which antibiotic works against the strain of bacteria I have identified.

When I finish all the tests the doctor has asked for, I'll record the results and notify her. We come up with

A technologist must do accurate testing. "A patient's life could depend on it," says Roberto.



Roberto confers with a coworker. "The hospital staff is a team," notes Roberto, "so you have to depend on each other."

results quickly, I'd say. I usually have something to report in 48 to 72 hours. Once in a while, when test results don't make sense to the patient's physician, we run tests on another specimen just to make sure. You can't be too careful in a medical lab. But mistakes sometimes happen, and our test results can be wrong. That's why the human factor—judgment—is so important.

Jessica just started working in the lab last week. She's in the clinical chemistry department and operates machinery that tests blood for sugar, salt, fat, and protein content, and for disease. She's testing for sugar content right now. She begins by placing tubes of blood in a machine that spins very fast, so fast that the blood cells fall to the bottom of each tube. The material that remains on top is the serum. It looks like water and contains the sugar; chemicals in the machine make the sugar turn blue. Knowing whether or not a patient has the proper amount of sugar in his blood helps a physician treat him properly. Many of the machines Jessica works with are linked up with a computer, enabling her to run literally thousands of different tests in a very short period of time. Computers have made a big difference in medicine, and you really appreciate that in a lab.

I ate lunch with Fritz today, as usual. Fritz has worked at St. John's nearly as long as I have, and we're good friends. He's in hematology, where they specialize in testing blood. Fritz does blood counts much of the time; he's concerned with the number of red cells and white cells in the blood. I guess you know already that red cells carry oxygen and white cells fight infection. Fritz operates machinery that places drops of a blood sample on a slide, stains the sample with colored dyes to help identify the cells, and smears the blood across the slide. Then he sets the slide under a microscope and looks closely at the white blood cells. Red cells all look alike, but white cells don't. Fritz can differentiate among white cells, and his count of the various kinds of white cells in the patient's blood will give the physician a good idea of whether or not something is wrong.

Another friend of mine, Wanda, works in the blood bank. Wanda and I talk about our jobs a lot. One of the things we both like is that our jobs rarely intrude on our personal time. In short, we leave our work in the laboratory. Wanda and the other technologists in the lab draw blood from blood donors--healthy people who donate blood to the blood bank. This blood is refrigerated in plastic bags and usually stays healthy for 21 days. The laboratory receives patients' blood samples in tubes from other parts of the hospital or from private physicians. These patients often are scheduled to undergo surgery, and doctors need to have blood available for transfusions. Medical technologists in the blood bank must find donors' blood that is compatible with patients' blood samples sent to the lab.

Technologists perform chemical tests to determine the type of blood in the sample. Blood may be typed A, B, AB, or O. In addition, technologists must determine the Rh factor as Rh positive or Rh negative, referring to the presence or absence of certain inherited substances in the red blood cells. The technologists then find stored blood that matches the blood in the patient's sample, and retest it as a precautionary measure. To be usable, the stored blood must be exactly like the patient's blood. In the event that no compatible blood is in storage, the technologists would contact the Red Cross to obtain the appropriate type.

Accuracy is essential in the blood bank and the workers here are under great pressure to avoid mistakes. A mistake by a laboratory technologist can kill a patient. Take the case of someone in an automobile accident who needs emergency surgery. If the lab made an error in testing and the patient received the wrong blood during the operation, he or she could die. That's an awesome responsibility.

Last fall I was invited to supervise some medical technology students who were doing their senior year clinical rotation in the biochemistry department here. I was surprised to discover how much I enjoyed teaching! I'm thinking of going back to school for a master's or Ph. D. so that I can teach full time in a college or university program in medical technology. But that's a pretty big step, after all.

Although my job can be routine at times, I know enough science to understand what the tests really mean. Once I've run some tests, I usually have an idea of what's going on inside the body of a patient with this or that disease. That makes the work interesting, and I don't know whether I want to give it up to teach.

And another thing. If I went into teaching, I might miss the day-to-day contact with the hospital staff. I like being part of the team effort here to help sick people. Well, I guess I'll have to give it a lot more thought ....

Exploring

Medical technologists must have a strong interest in science.

- Do you like science? Are you interested in biology and chemistry?
- Do you like to do laboratory experiments in class or on your own?
- Do you pursue science projects independently?
- Have you ever entered a science fair?
- Are you curious about the unknown?
- Do you like to study things under a microscope?
- Do you like to experiment with chemistry sets?

Medical technologists must be very accurate. Sometimes they are under pressure to work quickly, but they must be precise just the same. A patient's life might depend on it.

- Do you check your homework for errors?
- Do you check your answers on a test before handing it in?
- Do you do things in a methodical way?

Medical technologists must have an eye for detail. They have to detect even the slightest variations in the samples they examine.

- Do you enjoy identifying trees, leaves, or birds?
- Do you collect and identify sea shells?
- Can you tell that something is missing from your room?
- Can you find a place on a road map quickly?
- Do you like to do word-finds and other games where you must find hidden objects in pictures?

Medical technologists need manual dexterity to handle medical equipment such as test tubes, slides, and microscopes.

- Do you like working with your hands?
- Do you enjoy building models, setting up electric trains, framing pictures, making ceramics, making electronic equipment from a kit, or working with photographic equipment?
- Are you accustomed to using tools for work around the house?
- Are you good at setting up displays for class projects or school exhibits?

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Exploring Careers

Medical technologists don't spend much time with patients. They work with laboratory equipment instead.

- Do you like building things?
- Do you like collecting things?
- Do you enjoy class assignments that involve working with scientific equipment?

Medical technologists must be able to follow strict laboratory procedures.

- Do you pay attention to instructions when you're taking a test or doing a homework assignment?
- Are you good at following a recipe?
- Do you use patterns for sewing, knitting, or needlework?
- Do you follow the instructions carefully when you mix chemicals from your chemistry set, build a model, or assemble electronic equipment from a kit?

Medical technologists are members of a health care team. They must work well with others.

- Do you enjoy working with other people on class projects? Do you accept your share of the responsibility?
- Do you like working with others on school clubs or committees?
- Do you like team sports?
- Do you like to organize group activities such as parties, sports events, picnics, and dances?

Medical technologists must be concerned about good health.

- Do you eat a well-balanced diet?
- Do you see the dentist regularly?
- Do you get enough sleep?
- Do you pay attention to warnings about alcohol, drug, or tobacco abuse?
- When you ask someone how he or she is feeling, are you really concerned or do you consider it a social custom?

Medical technologists keep up with the field by reading professional literature and attending lectures and conferences.

- Do you like to read for pleasure?
- Do you like to read popular science magazines? Do you read articles on medicine and health in magazines and newspapers?
- Do you show initiative in doing research on subjects of personal interest?
- When you are curious about something, do you go to an encyclopedia or library to learn more about it?
- Do you look up words you don't understand in a dictionary?
- Do you like to browse in the "new books" section of your library?

Suggested Activities

Stimulate your interest in science by reading and doing experiments or projects.

- Work with a chemistry set, the kind available in hobby shops or department stores.
- Prepare slides and examine them under a microscope.
- Do a project in the life sciences for a science fair.
- Read popular science magazines.

Join a Science Club or a Health Careers Club if there is one in your school.

Contact your local chapter of the American National Red Cross to arrange a talk for your science or health class on the Red Cross blood program.

Ask your teacher to arrange a class tour of a medical laboratory.

Invite a medical technologist to speak to your class about his or her job. Ask the speaker to bring and explain some of the equipment used in a medical laboratory. Ask him or her to talk about job duties, training, and the rewards and frustrations of this kind of work.

Volunteer to work in the medical laboratory of a hospital, clinic, or nursing home. You might be able to run errands, wash equipment, or do clerical work.

Get in touch with the American National Red Cross about opportunities to work as a youth volunteer. Red Cross youth volunteers help recruit blood donors, serve as tutors for younger children, and as aides in hospitals, day care centers, and nursing homes.

Join an Explorer Post if there is one in your area. Exploring, open to young men and women aged 14 through 20, offers programs in medicine and health careers, physical or natural science, and emergency first aid. To find out about Explorer posts in your community, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Girl Scout, earn a proficiency badge in Science, Public Health, or First Aid.

Health Occupations

If you are a Boy Scout, earn a merit badge in General Science, Public Health, First Aid, Lifesaving, or Emergency Preparedness.

Take a course in first aid from a certified instructor.

Prepare a report for a science or health class on the diseases spread by rats, flies, worms, and ticks. Explain how people catch yellow fever, rabies, hookworm, typhoid fever, and tetanus.

Write for career information to American Medical Technologists, 710 Higgins Road, Park Ridge, Illinois 60068; American Society for Medical Technology, 5555 West Loop South, Bellaire, Texas 77401; American Society of Clinical Pathologists, Board of Registry, P.O. Box 4872, Chicago, Illinois 60680; and International Society for Clinical Laboratory Technology, 818 Olive Street, Suite 918, St. Louis, Missouri 63101.

Related Occupations

Medical technologists aren't the only people whose work in laboratories helps us to understand and treat disease. Ten other occupations are listed below. See if you can choose the correct job duty for each.

1. **Medical laboratory technician**
   a. prepares patients' medical records
   b. does routine laboratory tests for use in diagnosing or treating disease
   c. mixes drugs under the direction of pharmacist

2. **Veterinary laboratory technician**
   a. investigates animal diseases that can be caught by humans
   b. inspects livestock in slaughterhouses
   c. prepares vaccines that protect animals against disease

3. **Medical laboratory assistant**
   a. stores and labels plasma and does other routine work in a blood bank
   b. performs autopsies to determine the cause of death
   c. conducts research to protect medical laboratory personnel against infection

4. **Pathologist**
   a. runs a machine that does computerized brain scans
   b. studies disease and its effect on the cells and tissues of our bodies
   c. studies insects and their relation to plant life

5. **Chemist**
   a. conducts research and experiments on gaseous, liquid, and solid materials
   b. develops computer programs for drug manufacturers
   c. designs biomedical laboratory equipment

6. **Cytotechnologist**
   a. measures radioactivity in the cells of workers at nuclear reactors
   b. studies bee culture and breeding
   c. stains, mounts, and examines human body cells under a microscope

7. **Zoologist**
   a. designs natural habitats for animals in zoos
   b. studies origin, classification, habits, and diseases of animals
   c. plans breeding studies to improve varieties of plants

8. **Histologic technician**
   a. prepares sections of body tissues for examination by a pathologist
   b. removes deposits and stains from teeth
   c. operates ultrasound diagnostic equipment to produce pictures of internal organs

9. **Biochemist**
   a. specializes in taking X-rays of specific parts of the body
   b. measures impulse frequencies from the brain
   c. studies chemical processes of living organisms in order to understand allergies, vitamin deficiency, hormonal imbalance, and other medical problems

10. **Geneticist**
   a. handles legal problems in the field of inheritance taxes
   b. conducts research on inherited traits such as hair and eye color and resistance to disease
   c. tests blood samples using an automatic blood analyzer

See answers at end of chapter.

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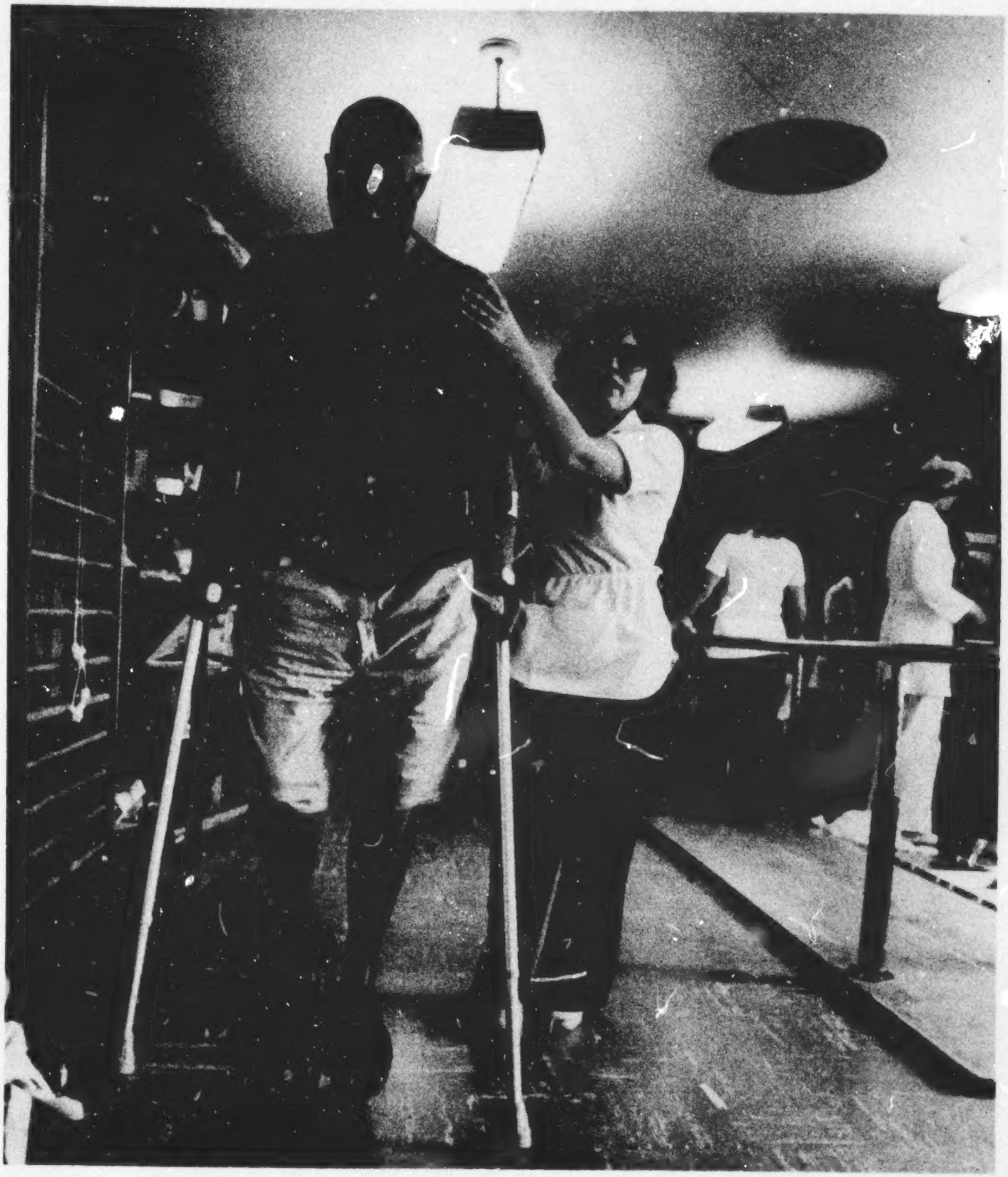
Physical Therapist



"Physical therapy is teaching patients how to help themselves," says Julie.

Doctors Hospital, with 500 beds, always seems busy, and the physical therapy department isn't immune from that hustle. Two patients were already in the waiting area when Julie arrived at 7:45. A middle-aged man was sitting quietly in a wheelchair and a fellow in his 20's was lying on a transport bed. Both were inpatients—patients staying at the hospital. Julie greeted them, said hello to the receptionist, and then went on to the treatment rooms. There, two other physical therapists were preparing for the patients in the waiting room.

"Hi, Tom."

Tom Harmon was adjusting the water temperature in the Hubbard tank for his burn patient, Joe Power. Joe had been badly burned when the gasoline can he had been holding had exploded. He had second and third degree burns on his legs and arms and first degree burns on his face. Joe had been using gasoline to restart the fire in a pile of smoldering weeds. He prefers not to talk about the accident.

The water in the Hubbard tank will make bending the burned limbs easier and soften the dead skin tissue so Tom can remove it. This was one of the treatments that physical therapists like Tom and Julie liked the least, because the patient usually is in so much pain. Without the treatment, though, the burned skin would tighten up and leave the patient with much less mobility after the burn healed. It gives the therapists some comfort to know the pain is worthwhile in the long run.

"Good morning, Nicki."

Nicki Bathista was the other therapist. She was setting up the parallel bars. Her first patient had lost his leg in a construction accident. He had just been fitted with an artificial leg and Nicki would help him learn to walk normally with it.

Julie was bound for room 514 and a patient she had seen several times in the last 2 days. After collecting the patient's records, she headed for the elevators.

"I hope the swelling in his leg is down today," Julie thought. While she waited for the elevator and on the ride up to the fifth floor, she reviewed Mark's case. Mark is an 18-year-old gas station attendant. Two nights ago, he was riding his motorcycle on the freeway when a drunken driver swerved into his lane, knocking him to the pavement. Mark's helmet prevented any head injuries and probably saved his life, but he didn't escape unharmed. He wound up with a cracked forearm, a fractured hip, and a badly fractured femur or thigh bone that was giving him a lot of trouble. The fracture had severed some important arteries in his leg. The surgeons had reconnected the arteries, but the swelling in his leg was considerable and the doctors weren't sure there was enough blood circulation. Inadequate circulation could mean that Mark would lose his leg. Before the fractured leg could be set and Mark wrapped in a cast to immobilize his hip and leg, the swelling had to be reduced and the surgeons had to be sure there was adequate circulation.

The elevator doors opened onto the fifth floor and Julie strode down to 514.

"Good morning, Mark," she said as she looked over his chart. "How is the leg?"

"It hurts a lot."

"Well, when the swelling goes down, that will improve," Julie told him. The exercises she was about to help him with were supposed to reduce the swelling.

Mark looked unhappy. Although she didn't ask, Julie guessed that no one had visited him yet. Yesterday, Mark had told her that no one had come to see him. He was sure no one cared.

"Come on, Mark. Let's get to it! We'll have you up and out in no time!" Julie tried to encourage Mark and boost his morale. Realizing that she was concerned about him would, she hoped, ease his loneliness.

The exercises Mark performed were prescribed by a physician. After she had performed the emergency surgery on Mark's injured leg, the surgeon had written an "order" or prescription for Mark to receive physical therapy. Ordinarily, Julie would know exactly what to do after reading the order, but Mark's injuries were extensive and Julie wanted no chance for an error in his treatment. So, before she even visited with Mark, she consulted with the physician and discussed her goals for Mark's treatment.

The surgeon wanted her to exercise Mark's injured leg to promote improved circulation and prevent the muscles from withering away. Mark would be hospitalized a long time and where muscle tone is concerned, "If you don't use it, you lose it."

"We'll start out slowly, Mark. Just wiggle the toes on this injured leg." The exertion caused Mark some pain, but Julie explained how necessary the exercises were to the leg's recovery, so Mark didn't complain.

"O.K. Now tighten your thigh muscles to move your knee caps."

"He's doing pretty well," Julie thought. "In spite of his depression, he's trying hard at his therapy, so, as his physical condition improves, his spirits probably will improve too."

Julie's next patient was a special one. Sarah was a 5-year-old with cerebral palsy. Cerebral palsy affects the brain so that the patient has great difficulty controlling the muscles used for moving about. Physical coordination is greatly hampered, but with the proper therapy, improvement usually is possible. Julie's evaluation of Sarah at this time indicated the child had the physical coordination of an 8-month-old baby. Sarah was still

"The best part of my job is sharing the joy of patients who are making progress."

improving, though, so she may eventually learn to walk. The damage from cerebral palsy is difficult to identify. The therapist doesn't know the limits of a patient's abilities until he or she reaches them. When the patient stops improving, then the therapist knows the extent of the damage.

"Good morning, Sarah. Let's practice our rolling."

She and Sarah then rolled around on the floor mats of the treatment room. First, Julie rolled over—demonstrating the move with considerable enthusiasm. Then, with Julie's help, Sarah took her turn.

"She almost has the knack of rolling over," thought Julie. "Maybe next week I can start teaching her to crawl."

After crawling, Julie would try to teach Sarah to sit, then kneel, then stand, and, she hoped, walk.

As Sarah and her mother were leaving, Toby Pappas walked in. Toby, a high school junior, is a volunteer aide here in the P.T. department. Two months ago, when he first started working here, he transported patients to and from their rooms. Since then, he has gradually been learning how to assist with the treatments. His friendly, easygoing manner has won him quick acceptance from the patients. Toby obviously enjoys helping Julie, and she takes extra time to explain the equipment and procedures to him. Toby is a bright student and Julie hopes to interest him in physical therapy as a career.

"Hi, Toby. Want to help with a stroke patient?"

"Sure, Julie, but I haven't had experience with a stroke victim."

Julie explained that a stroke occurs when the flow of blood is cut off to some part of the brain. "Without the lifegiving oxygen supplied by fresh blood from the lungs, brain cells will be damaged after only a few minutes. If the interruption is complete enough, the brain cells will die in less than 10 minutes. The effects of the stroke depend on the area of the brain involved.

"The first job of the therapist, Toby, is to evaluate the patient. Every stroke patient is different. Some patients can't use their legs. With others, only the arms are affected. Many can't talk. So you have to isolate the muscle groups that are affected and then work to reeducate those muscles and raise the patient's level of functioning to his or her full potential.

"Mr. Davis' stroke left him with his right side paralyzed. At first, he wasn't even aware of the position of his right arm or leg. We first moved the arms and legs for him to maintain the capability for motion in his joints. Then we helped him roll from side to side on his bed. After he could do that by himself, we taught him to sit up in bed. Now we are going to work on teaching him to kneel, to stand, and to walk.

"Of course, all that will take time. And, if the stroke completely killed the brain cells that control those functions, Mr. Davis won't make any more progress."

"What can I do to help today?" asked Toby.

"I'll be teaching Mr. Davis how to move his body from a sitting position to a kneeling one. He won't be able to master that today, though, and that may discourage him. You can help boost his spirits by encouraging him and giving him praise."

"I'll do my best."

"Oh, Toby. One more thing. Mr. Davis' speech was affected by his stroke. A speech therapist is working with him, but he still can't talk. Don't worry, though. He understands every word that is said."

Toby went to the waiting room and brought Mr. Davis to the treatment area while Julie reviewed his treatment record.

After Mr. Davis had completed his routine, Toby took him in his wheelchair back to his room.

It was lunchtime for Julie, and she had been looking forward to it. A quick lunch at the El Sombrero, a restaurant across the street. "Come on, Toby, I can't wait for those tacos and tamales."

At night the El Sombrero was a posh dining spot with mariachi singers and substantial prices. At noon, however, it offered a quick and reasonable lunch.

After they were seated, Toby asked Julie how she first became interested in physical therapy.

"Doing volunteer work, just like you," replied Julie. "I volunteered to help at St. John's Hospital and was assigned to the P.T. department. I liked the work so much that I majored in physical therapy when I went to college."

"What was the course work like in college?"

"A lot of science. I had courses in chemistry, biology, physics, neurology, physiology, and anatomy. Psychology was required, too, and that proved to be very helpful. A course in psychology of the handicapped really opened my eyes to the way handicapped persons view the world and helped me understand some of their hopes and fears."

Julie went on to explain the "rotating" assignments she had had during the last half of her senior year in college. "That was a valuable experience. It gave me a taste of the day-to-day work in most of the specialty areas as well as the general practice of physical therapy. I spent 1 week in Children's Hospital, 6 weeks in the Wheaton Rehabilitation Center, 2 weeks at Pleasant View Nursing Home, and 5 weeks here at Doctors Hospital.

"It was during my rotation that I discovered I really preferred working with a variety of patient problems—the sort of variety you're most likely to find in a hospital like this. After I passed the State board examination and got my license to practice physical therapy, I applied here at Doctors.

"Since then," she said with a smile, "I've had to take up swimming just to keep my weight down and still eat lunches here at El Sombrero."

Exploring

Physical therapists must be concerned about good health.

- Do you eat a well-balanced diet?
- Do you get enough sleep?
- Do you see the dentist regularly?
- Do you pay attention to warnings about alcohol, drugs, or tobacco abuse?
- When you ask someone how he or she is feeling, are you really concerned or do you consider it a social custom?

Physical therapists must be interested in science.

- Do you like science courses?
- Do you enjoy doing projects for a science class or a science fair?
- Do you read articles about science in magazines or the newspaper?
- Do you like to visit museum exhibits of science and technology?

Physical therapists must teach patients special exercises.

- Do you like to help your friends with homework?
- Are you good at teaching children sports or directing them in arts and crafts?
- Are you good at teaching a child to swim or ride a bicycle?
- Have you ever tutored elementary school children?
- Do you help your younger brothers or sisters with reading, writing, or arithmetic?

Physical therapists don't see the results of their work right away. They must remain supportive and hopeful even when progress is slow.

- Do you appreciate small gains or progress?
- Do you have the patience to grow a garden?
- Can you stick with a diet or exercise program?
- Do you appreciate the eventual benefit of having braces on your teeth right now?
- Do you have the patience to practice a musical instrument faithfully?

Physical therapists must believe that one can succeed if he or she really tries.

- Are you an optimistic, upbeat person?
- Can you make people believe in themselves?
- Do you look at the bright side of things?
- Can you talk someone into a good mood?
- Are you able to comfort a younger brother or sister when his or her feelings have been hurt?
- Are you good at boosting a friend's confidence when he or she is nervous about an exam, a tryout, or asking someone for a date?
- Would you be good at coaching a team that's on a losing streak?

Physical therapists who are physically fit are more effective on the job. They serve as models for their patients.

- Are you in good physical condition?
- Do you enjoy strenuous activities such as sports, hiking, backpacking, climbing, track and field, dancing, and gardening?
- Do you like to be active most of the time?
- Do you consider physical exercise and development as important as mental development?

Physical therapists need manual dexterity. They must be good with their hands to help patients perform exercises and to handle equipment.

- Do you like working with your hands?

- Do you enjoy building models, setting up electric trains, framing pictures, making ceramics, weaving, or doing macrame?
- Are you accustomed to using tools for work around the house?
- Are you good at setting up displays for class projects or school exhibits?
- Have you ever helped build the props for a school theatrical production?

Physical therapists keep up with the field by reading professional literature and attending lectures and conferences.

- Do you like to read for pleasure?
- Do you like to read popular science magazines?
- Do you show initiative in doing research on subjects of personal interest?
- When you are curious about something, do you go to an encyclopedia or library to learn more about it?
- Do you look up words you don't understand in the dictionary?
- Do you like to browse in the "new books" section of your library?

Physical therapists are part of a health team. They work with physicians, psychologists, nurses, and social workers in planning patient care.

- Do you enjoy working with other people on class projects?
- Do you like working with others on school clubs or committees?
- Do you like taking part in recycling campaigns or scrap paper drives?
- Do you like to help organize trips, parties, sports events, picnics, and dances?

Suggested activities

Volunteer to work in a hospital, nursing home, or clinic in your community.

Look for opportunities to spend time with handicapped or retarded children. Studying and playing with handicapped children will help you develop the natural, accepting manner that physical therapists must have to deal effectively with disabled patients. Girls' Clubs and Boys' Clubs in many communities offer programs including volunteer service at hospitals and work with retarded and handicapped children. Red Cross youth volunteers play and study with homebound and handicapped children. Scout troops, Campfire Girls, and other youth organizations offer similar opportunities.

Ask your teacher to arrange a class tour of the physical therapy department of a local hospital or nursing home.

Invite a physical therapist to speak to your class about his or her job. Suggest that the speaker bring some equipment and demonstrate its use. Ask him or her to discuss job duties, training, and the rewards and frustrations of the work.

Interview a friend or classmate who has undergone physical therapy. Find out about his or her treatment and relationship with the physical therapist.

Help manage a team involved in a contact sport such as football in which bone, muscle, and nerve injuries are common. Observe the kinds of therapy the injured players are undergoing.

Take the Junior Life Saving Course offered by the American Red Cross or the Boy Scouts of America, or a course offered by another certified organization.

Develop your teaching skills by volunteering to help direct children in sports or arts and crafts at a day care center or summer recreational program.

Join an Explorer Post if there is one in your area. Exploring, open to young men and women aged 14 through 20, offers programs in medicine and health careers, physical or natural science, and emergency first aid. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Girl Scout, earn a proficiency badge in First Aid, Lifesaving, Public Health, or Science.

If your are a Boy Scout, earn a merit badge in Personal Fitness, Lifesaving, Emergency Preparedness, Public Health, First Aid, or General Science.

Use the topic of rehabilitation for a report in a science or health class. You might prepare a report, together with charts and other illustrations, that show the muscles of the body and how they interact. Explain how exercises can strengthen various parts of your body such as your arms, shoulders, chest, abdomen, back, or legs.

Health Occupations

Prepare a report for a health class on what to do for heatstroke, heat exhaustion, frostbite, bruises, and arm and leg cramps.

Develop an exercise program to increase your strength, endurance, speed, and coordination. Include calisthenics, running, swimming, jumping, and other activities.

Write for career information to the American Physical Therapy Association, 1156 15th Street, N.W., Washington, D.C. 20005, and to the Veterans Administration, Department of Medicine and Surgery, 810 Vermont Avenue, N.W., Washington, D.C. 20420.

Related Occupations

Physical therapists are not the only workers involved in therapy and rehabilitation. The duties of other workers in this field are described below. Match these duties with the job titles listed at the end.

1. I teach art to help my patients express their feelings and do something that makes them feel better about themselves. I work with patients in such places as rehabilitation centers and mental hospitals. Who am I?

2. I design, make, and fit artificial limbs known as prostheses. Who am I?

3. My patients are mentally or physically disabled. I help them master everyday skills such as shaving, and teach them things like woodworking or gardening that make their day more enjoyable. If I can, I teach them skills that will help them get a job. Who am I?

4. I'm a doctor. I move the spine. I correct nervous disorders that way. Who am I?

5. My patients have trouble hearing and speaking normally. I plan therapy programs to help them communicate more effectively. Who am I?

6. I teach music to help my patients express their feelings and do something that makes them feel better about themselves. I work with patients in such places as rehabilitation centers and mental hospitals. Who am I?

7. I'm a doctor. I treat patients with bone, muscle, or nerve disorders. Depending on the problem, I perform surgery or prescribe drugs. Who am I?

8. I help physical therapists such as Julie treat physically disabled patients. I often get patients ready for treatment and help them do exercises. Who am I?

9. I'm a doctor. I perform operations to correct bone problems. Who am I?

10. I plan and direct activities such as sports, arts and crafts, and social functions for patients in hospitals and other institutions. Who am I?

11. I teach dance to help my patients express their feelings and do something that makes them feel better about themselves. I work with patients in such places as rehabilitation centers and mental hospitals. Who am I?

12. I help occupational therapists treat patients who are mentally or physically disabled. I might teach patients to dress themselves, to play games, to enjoy dramatics, or to make ceramics. Who am I?

13. I operate equipment that helps patients breathe. Who am I?

Physical therapist assistant or aide

Occupational therapist

Occupational therapy assistant

Speech pathologist or audiologist

Respiratory therapy worker

Recreational therapist

Art therapist

Music therapist

Prosthetist

Chiropractor

Osteopathic physician

Orthopedic surgeon

Dance therapist

See answers at end of chapter.

Exploring Careers

Job Facts

There isn't room in this book for a story about every health occupation. However, you'll find some important facts about 32 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
MEDICAL PRACTITIONERS			
Chiropractors	Chiropractors treat patients primarily by using their hands to manipulate parts of the body, especially the spinal column. Their practice is based on the principle that one's health is determined largely by the nervous system. Most are in private practice. Some are salaried assistants of established practitioners or work for chiropractic clinics. Others teach or do research at chiropractic colleges. Chiropractors often set up their practices in small communities—about half work in cities of 50,000 people or less.	It takes many years of schooling to become a chiropractor. To qualify for the license required to practice, applicants must graduate from a chiropractic college and pass a State board examination. Most States require 2 years of study in a college or university before entering the 4-year program in a chiropractic college. Chiropractors licensed in one State often may obtain a license in another State without further examination. High school students interested in becoming chiropractors should take as many science courses as possible.	Most newly licensed chiropractors either set up a new practice or purchase an established one. A moderate financial investment usually is necessary to open and equip an office.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Optometrists	Optometrists examine people's eyes. They prescribe lenses, corrective eye exercises and other treatment not requiring drugs or surgery. Some optometrists specialize in working with special groups such as the elderly, children, and industrial workers. Most are in solo practice. Others are in partnership or group practice. Some treat patients in hospitals and eye clinics, or teach. Others work for insurance companies, act as consultants to engineers specializing in safety or lighting, or to educators in remedial reading. Some serve on health advisory committees.	It takes many years of training to become an optometrist. To qualify for the required license, applicants must complete a 4-year program in a college of optometry and pass a State board examination. This is preceded by at least 2 years of study in a college or university. Several States allow applicants to be licensed without lengthy examination if they have a license in another State. Optometrists wishing to advance in a specialized field may study for a master's or doctor's degree in physiological optics, neurophysiology, public health administration, health information and communication, or health education. High school students interested in becoming optometrists should take as many science courses as possible.	Optometrists should not be confused with ophthalmologists or dispensing opticians. Ophthalmologists are physicians who specialize in eye care, perform eye surgery, and prescribe drugs or other treatment, as well as lenses. Dispensing opticians fit and adjust eyeglasses according to prescriptions written by optometrists or ophthalmologists. Independent practitioners may work over 40 hours a week including weekends. Because the work is not strenuous, they often can continue to practice after normal retirement age.
Osteopathic Physicians	Osteopathic physicians diagnose and treat medical problems involving the muscles and bones. Manipulation with their hands is a basic form of treatment. They also use surgery, drugs, and other methods of medical care. Most osteopaths are in private practice. A small number work in osteopathic colleges and hospitals, private industry, or government agencies.	It takes many years of schooling to become an osteopathic physician. To qualify for the required license, candidates must graduate from an osteopathic college and pass a State board examination. Candidates must complete at least 3 years of college (although most earn a bachelor's degree) before entering the 3–4 year program in an osteopathic college. Nearly all serve a 1-year internship after graduation. Specialists complete 2–5 years of additional training. Nearly all States grant licenses without further examination to those already licensed in another State. High school students interested in becoming osteopathic physicians should take as many science courses as possible.	Newly qualified doctors of osteopathic medicine usually establish their own practice, although a growing number are entering group practice. Many work over 50 or 60 hours a week. Those in general practice work longer, more irregular hours than specialists.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Physicians	Physicians perform medical examinations, diagnose disease, treat people who are suffering from injury or disease, and advise patients on self-care to prevent illness. A decreasing percentage of physicians are general practitioners; most specialize in one of many fields for which there is graduate training. Nine out of 10 physicians provide patient care. Most of these have office practices although some work as residents or full-time staff in hospitals. Other physicians teach or perform administrative or research duties. The northeastern States have the highest ratio of physicians to population and the southern States the lowest.	It takes many years of schooling to become a physician. To qualify for the required license, candidates usually must complete at least 3 years of college (although most earn a bachelor's degree) and 4 years of medical school, pass a licensing examination, and, in most States, serve a 1- or 2-year residency after graduation. Those planning to work in general practice often spend an additional year in a hospital residency. Those seeking certification in a specialty spend from 2 to 4 years in advanced residency training, followed by 2 years or more of practice in the specialty. They then must pass specialty exams. Some physicians who want to teach or do research earn a master's or Ph. D. degree in a field such as biochemistry or microbiology. Although physicians licensed in one State usually can get a license in another State without further examination, some States limit the reciprocity. High school students interested in becoming physicians should take as many science courses as possible.	Many physicians have long working days and irregular hours. Most specialists work fewer hours than general practitioners. Although they may work shorter hours, many continue in practice well beyond 70 years of age. Newly qualified physicians who establish their own practice must make a sizable financial investment to equip a modern office.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Podiatrists	Podiatrists diagnose and treat corns, bunions, calluses, ingrown toenails and other foot problems. They perform surgery, fit corrective devices, and prescribe drugs, physical therapy, and proper shoes. Some specialize in foot care for the elderly or for children, or in foot surgery. But most podiatrists provide all types of foot care. Most podiatrists are in private practice. Some, however, are employed by hospitals, podiatric medical colleges, and public health departments.	It takes many years of schooling to become a podiatrist. To qualify for the required license, candidates usually must complete at least 3 years of college (although most earn at least a bachelor's degree) and 4 years in a podiatry school, and pass a State board examination. Additional education and experience are necessary to practice in a specialty. Several States require a 1-year residency after graduation. Most States grant licenses without further examination to those licensed by another State. High school students interested in becoming podiatrists should take as many science courses as possible.	Most newly licensed podiatrists set up their own practices. Some obtain salaried positions to gain the experience and money needed to begin their own practice.
Veterinarians	Veterinarians deal with diseases and injuries among animals. They perform surgery and prescribe and administer drugs, medicines, and vaccines to animals. Over one-third of veterinarians treat small animals exclusively. About another third treat both large and small animals. Many specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. Some inspect foods as part of public health programs, teach, or do research. Most veterinarians are in private practice. Some work for government health agencies, colleges of veterinary medicine, research laboratories, large livestock farms, animal food companies, and pharmaceutical firms.	It takes many years of schooling to become a veterinarian. To qualify for the required license, candidates usually must complete at least 2 years of college (although most complete more) and 4 years in a college of veterinary medicine, and pass a State board examination. Positions in research and teaching often require an additional master's or Ph. D. degree. Some States issue licenses to veterinarians already licensed by another State without further examination. High school students interested in becoming veterinarians should take as many science courses as possible.	The type of practice varies according to the geographic setting. Veterinarians in rural areas mainly treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets. Most begin as employees or partners in established practices. The job may involve long and irregular hours, traveling and outdoor work, and danger of injury, disease, or infection. Those in private practice usually work well beyond normal retirement age.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
DENTAL OCCUPATIONS			
Dentists	Dentists examine and treat patients for oral diseases and abnormalities, such as decayed and impacted teeth. Most dentists are general practitioners, but some specialize. Orthodontists are the largest group of specialists; they straighten teeth. The next largest group, oral surgeons, operate on the mouth and jaws. About 9 out of 10 dentists are in private practice. Some dentists teach in dental schools, do research, or administer dental health programs.	It takes many years of schooling to become a dentist. To qualify for the license to practice dentistry, applicants must graduate from dental school and pass written and practical examinations. Dental school training generally lasts 4 years following 2 to 4 years of study in a college or university. Most people have a bachelor's or master's degree before they begin their dental training. Specialists need 2 to 3 years of formal training after graduation from dental school; they may also have to pass a special exam. Dentists who want to teach or do research also spend additional years in advanced training. In order to practice in another State, dentists usually must pass the State's exam. High school students who want to become dentists should take as many science courses as possible.	Dentists usually work between 40 and 45 hours per week, although many spend over 50 hours a week in their offices. Many continue part-time practice well beyond usual retirement age.
Dental Assistants	These workers help dentists while they are working with patients. They do such things as obtain dental records, hand the dentist the necessary instruments, keep the patient's mouth clear, and prepare materials for impressions of teeth. Most dental assistants work in private dental offices. Some work in dental schools, hospital dental departments, State and local public health departments, or private clinics.	Most learn their skills on the job. However, an increasing number of dental assistants complete 1- or 2-year post-high school programs, primarily in junior or community colleges and vocational or technical schools. Graduates of accredited programs who complete an exam may be certified. Certification is an acknowledgment of one's qualifications, but is not generally required for employment. High school students interested in this work should take courses in biology, chemistry, health, typing, and office practices.	The work of the dental assistant should not be confused with that of the dental hygienist, who must be licensed to scale and polish teeth. Dental assistants must be careful in handling radiographic and other equipment.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Dental Hygienists	Dental hygienists scale, clean, and polish teeth, expose X-rays, and instruct patients in proper oral hygiene. Most work in private dental offices. Others work in public health agencies, school systems, industrial plants, clinics, hospitals, dental hygiene schools, and the Federal Government. Some who are graduates of bachelor's degree programs are commissioned officers in the Armed Forces.	Dental hygienists must have a license. Candidates for licensure in most States must be graduates of an accredited dental hygiene school and pass both a written and a clinical exam. Most schools of dental hygiene grant an associate degree; some programs lead to a bachelor's degree. A few schools offer master's degree programs in dental hygiene or related fields. Among the courses recommended for high school students interested in this occupation are biology, health, chemistry, and mathematics.	Many hygienists work part time. Hours may include weekends and evenings. Some work for more than one dentist.
Dental Laboratory Technicians	These workers make dentures, braces, crowns, and other dental and orthodontal appliances. All work is done following the dentist's written instructions. Most technicians work in commercial laboratories. Others work in dentists' offices, hospitals, and for the Federal Government.	Many dental laboratory technicians learn their skills on the job, although more and more are taking formal training programs before starting work. On-the-job training generally takes 4 to 5 years. Some schools offer 2-year programs for high school graduates. About 3 years of practical experience are needed after that, however. Technicians may become certified by passing written and practical exams. Certification is becoming increasingly important as evidence of a technician's competence. High school students interested in this occupation should take courses in art, crafts, metal shop, and sciences.	Salaried technicians usually work 40 hours a week while self-employed technicians often work longer hours. Experienced technicians may advance to jobs as supervisors or managers in dental laboratories, teachers in dental lab training programs, or sales representatives for companies that manufacture dental materials and equipment.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
NURSING OCCUPATIONS			
Registered Nurses	Registered nurses provide care for the sick and help healthy people stay well. The setting in which they work usually determines the scope of their responsibilities. They observe their patients' progress; administer medications; assist in rehabilitation of patients; teach people about good health; and do research. Most nurses work in hospitals, nursing homes, and other institutional health facilities. Others work in public health departments, home health agencies, clinics, and private industry. Some work in offices of physicians or are private duty nurses hired directly by patients. Some nurses teach, do research, or are staff members of professional organizations.	A license is required. A nurse must be a graduate of an approved school of nursing and pass a State exam. Training programs include 2-year associate degree programs in junior and community colleges; 3-year diploma programs in hospitals and independent schools; and 4 or 5-year bachelor's degree programs in colleges and universities. A minimum of a bachelor's degree, and often a master's or doctoral degree, is preferred for administrative or management, teaching, research, or consulting jobs, and for clinical specialization. High school students interested in becoming registered nurses should take as many science courses as possible.	About one-third work part time. Most hospital and nursing home nurses receive extra pay for work on evening and night shifts.
Licensed Practical Nurses	Licensed practical nurses provide much of the bedside care needed by hospital patients. They take temperature and blood pressure, change dressings, and bathe patients. They perform many other nursing functions such as making patients comfortable in their homes and preparing patients for examination in doctors' offices. Three out of 5 work in hospitals. Most of the others work in nursing homes, clinics, doctors' offices, sanitariums, and long-term care facilities. Some work for public health agencies and welfare and religious organizations. Self-employed nurses work in hospitals or in the homes of their patients.	A license is required. Applicants must complete an approved practical nursing course, generally 1 year long, and pass an exam. Although requirements for enrollment in training programs range from eighth or ninth grade to high school graduation, high school graduates are preferred. State-approved programs are offered in trade, technical, and vocational schools, junior colleges, local hospitals, health agencies, and private educational institutions. High school students interested in becoming licensed practical nurses should take as many science courses as possible.	In California and Texas, these nurses are called licensed vocational nurses. In hospitals, hours may include nights, weekends, and holidays. In private homes, LPN's often work 8 to 12 hours a day but can arrange their own hours and vacations. Advancement is limited without additional training or education. In-service educational programs prepare LPN's for work in specialized areas such as intensive care units or post-surgery recovery rooms.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Nursing Aides, Orderlies, and Attendants	These workers handle many of the routine aspects of patient care in hospitals, nursing homes, and other health facilities. They answer patients' bell calls, assist patients in walking, transport and set up heavy equipment, and clean patients' rooms.	Nursing aides, orderlies, and attendants train on the job from several days to a few months, sometimes combined with classroom instruction. Some employers prefer high school graduates while many do not. Courses in home nursing and first aid, offered by many public school systems and community agencies, provide a useful background. Volunteer work and temporary summer jobs in hospitals and similar institutions also are helpful.	Other job titles include hospital attendant, nursing assistant, auxiliary nursing worker, geriatric aide, and psychiatric aide. Similar work is done in patients' homes by homemaker-home health aides, who provide personal care plus some cooking and light housework. Hours may include nights, weekends, and holidays.
THERAPY AND REHABILITATION OCCUPATIONS			
Occupational Therapists	Occupational therapists organize educational, vocational, and recreational activities to help mentally or physically disabled persons become self-sufficient. Therapy programs are tailored to the clients' needs, and often are part of an overall treatment plan developed by a health team. Therapists teach skills such as weaving, leather working, typing, and the use of power tools; they also help patients relearn daily routines such as eating and dressing. Almost half work in hospitals. Most of the rest work in rehabilitation centers, nursing homes, schools, clinics, community mental health centers, and research centers. Some work in sanitariums or camps for handicapped children, public health departments, or for home health agencies.	A bachelor's degree in occupational therapy usually is required. Certificate programs are available to those with a bachelor's degree in another field. A graduate degree often is required for teaching, research, or administrative work. Graduates of accredited programs who pass an exam become registered occupational therapists. High school students interested in becoming occupational therapists should take courses in health, biology, chemistry, and crafts.	Newly graduated occupational therapists begin as staff therapists. Advancement is chiefly to supervisory or administrative positions. Many part-time jobs are available. Many work for more than one employer and travel between locations.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Occupational Therapy Assistants and Aides	Assistants work directly with physically or mentally disabled patients under the supervision of occupational therapists. They help patients with their exercises and teach them simple skills. About half work in hospitals. The rest work in nursing homes, clinics, schools for handicapped or mentally retarded children, and rehabilitation centers. Aides handle the more routine tasks, including clerical duties. They prepare work materials, keep patients' records, and prepare clinical notes.	Assistants usually complete a 2-year associate degree program in a junior college or a 1-year vocational or techinal school program after high school. Aides train on the job. The length and content of training vary. Assistants who pass an exam become certified. Certified occupational therapy assistants with 4 years of approved experience may take the examination to become a registered occupational therapist without completing the remaining 2 years of study for a bachelor's degree. Among the subjects recommended for high school students interested in the occupational therapy field are health, biology, and crafts.	Some work evenings, weekends, and part time.
Physical Therapists	Physical therapists help people with muscle, nerve, joint, and bone disease and injuries to regain some of their strength and ability to move. Therapy consists of exercise, massage, and the use of heat and cold, light, water, or electricity to relieve pain or improve the condition of muscles and skin. Some therapists work in hospitals. Others work in nursing homes, rehabilitation centers, schools for handicapped children, and clinics. Some work for public health departments or home health agencies. Others teach or serve as consultants.	A license is required. Candidates must either earn a bachelor's degree in physical therapy, or for those who have a bachelor's degree in another field, earn a second bachelor's degree or certifiation through a special 12- to 16-month program. They must pass a State board exam. A graduate degree may be important for teaching, research, and administrative positions. Health, biology, mathematics, and physical education are useful high school courses.	Many physical therapists work part time.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Physical Therapist Assistants and Aides	Assistants work directly with patients under the supervision of a physical therapist. They help patients do their exercises and instruct them in the proper use of artificial limbs, braces, and splints. Aides handle more routine tasks, including clerical duties. They help patients prepare for treatment, assemble equipment, and keep records. Most assistants and aides work in hospitals. Some work for physical therapists who are in private practice. Still others work in clinics, rehabilitation centers, nursing homes, community health agencies, and schools for handicapped or mentally retarded children.	Training requirements for assistants are not uniform throughout the country. Some States require a license calling for graduation from an approved 2-year associate degree program from a junior college and passing an exam. In States not requiring a license, aides may advance to assistants through on-the-job training, but graduates of approved programs often are preferred. Aides train on the job. The length and content of programs vary widely, but high school graduation generally is required. Recommended high school courses include health, biology, physical education, and mathematics.	In some small health care institutions, the assistant or aide may assume most of the duties of the physical therapist, within the limits of his or her training.
Speech Pathologists and Audiologists	Speech pathologists and audiologists work with children and adults who have speech or hearing disorders. After testing to find out the cause of the problem, they provide treatment. While most work directly with patients, some teach, do research, or perform administrative duties. Over half work in schools. Others work in speech and hearing clinics, research centers, government agencies, and industry. Some speech pathologists and audiologists are in private practice.	Training for this occupation is provided through bachelor's or master's degree programs in speech and hearing. The master's degree, offered by several hundred colleges and universities, is on the way to becoming the usual requirement for entry into the field. Some States require speech pathologists and audiologists who work in public schools to have a teaching certificate, too. Many States require licenses of those who practice outside the schools. Certification by the American Speech and Hearing Association requires a master's degree, a 1-year internship, and an exam, and usually is necessary to advance. High school students interested in becoming speech pathologists and audiologists should take as many courses in science and language as possible.	Many work over 40 hours a week. Many, particularly those in colleges and universities, supplement their salaries through consulting, research, and writing books or articles.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
MEDICAL TECHNOLOGIST, TECHNICIAN, AND ASSISTANT OCCUPATIONS			
Electrocardiograph (EKG) Technicians	These workers operate machines that record electrical changes that occur during a heartbeat. This machine is used to help diagnose heart disease and record the progress of patients with heart conditions. Most work in hospitals. Some work in clinics and doctors' offices.	EKG technicians generally train on the job for several months to 1 year. High school graduation generally is required. Vocational school or college courses in cardiology technology and anatomy are helpful. Large hospitals sometimes promote EKG technicians to supervisors. Advancement to cardiovascular technician, cardiopulmonary technician, and cardiology technologist also is possible. Among high school courses recommended for students interested in the field are health and biology.	Mechanical aptitude, the ability to follow detailed instructions, and presence of mind in emergencies are important qualities. Hours may include weekends.
Electroencephalographic (EEG) Technologists and Technicians	These workers operate machinery that records electrical activity of the brain. This machinery is used to help diagnose disease and determine how it is affecting the brain. Technologists, as a result of their more thorough understanding of electroencephalography, supervise technicians. Although most work in hospitals, many have jobs with private physicians who specialize in brain and nervous system disorders—neurologists and neurosurgeons.	Although many are trained on the job, formal training programs are increasingly important, as a way of learning to operate the sophisticated equipment these workers use. Training programs in colleges, junior colleges, medical schools, hospitals, and vocational and technical schools generally last 1 to 2 years. Some workers advance to chief electroencephalographic technologist. Chief technologists are supervised by an electroencephalographer, or by a neurologist or neurosurgeon. High school students considering this occupation should take courses in biology, health, and electronics.	Manual dexterity, good vision, and an aptitude for working with electronic equipment are important qualities. Some hospitals require standby emergency service after hours and on weekends and holidays.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Emergency Medical Technicians	These workers provide immediate medical care in such emergencies as an automobile accident, heart attack, near-drowning, unscheduled childbirth, poisoning, or gunshot wound. They must quickly determine the nature of the emergency and establish priorities for medical care. About half are volunteers on rescue squads. Paid technicians work for police and fire departments, private ambulance companies, funeral homes, and hospital-based ambulance squads.	Good eyesight, dexterity, and physical coordination are necessary. Because they work under trying conditions, good judgment under stress, leadership ability, and emotional stability are important. Emergency medical technicians must complete an 81-hour training course developed by the U.S. Department of Transportation. Other training courses are available, too. Applicants must be 18 years old and have a high school diploma and a driver's license.	There are two other types of emergency medical technicians: Paramedics and dispatchers. Paramedics, working under the direction of physicians by radio communication, administer drugs and use more complex equipment than basic emergency medical technicians. Dispatchers, by means of telephone and radio, serve as a communications link between the medical facility and those who are sent to attend the emergency patients. Those in fire departments often work 56 hours a week. Volunteers work 8 to 12 hours a week. Those in ambulance services often work nights and weekends.
Medical Laboratory Workers	People in this occupation are either medical technologists, technicians, or assistants. These workers analyze the blood, fluids, and tissues in the human body, using precision instruments such as microscopes and automatic analyzers. Laboratory tests help in the detection, diagnosis, and treatment of disease. Workers with more training can handle the more complex jobs in the laboratory. Most work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions.	Medical technologists are the most highly trained. They are college graduates with a major in medical technology. Technicians get their training in 2-year programs in community and junior colleges, trade schools, technical institutes, or in the Armed Forces. Assistants learn their skills on the job or take 1-year programs in hospitals, trade schools, or technical institutes. Some community and junior colleges offer programs in cooperation with hospitals. In some States, technologists and technicians must be licensed. This may require a written examination. High school courses in science and mathematics are recommended for students interested in this field.	Technologists may advance to supervisory positions or to administrative medical technologist in a large hospital. With additional education and experience, technicians can advance to technologists and assistants to technicians. Accuracy, the ability to work under pressure, manual dexterity, and normal color vision are important. In hospitals, workers can expect night and weekend duty.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Medical Record Technicians and Clerks	These workers maintain medical records, reports, disease indexes, and statistics. Medical records are indispensable for diagnosis and treatment and also are used for verifying legal claims, charting health trends, and medical research. In large hospitals, the medical records department is supervised by a medical record administrator; in smaller hospitals, experienced medical record technicians have this responsibility. Clerks perform more routine tasks that require a minimum of specialized knowledge. Although most work in hospitals, some work in clinics, nursing homes, community health centers, government agencies, consulting firms, and health maintenance organizations. Others work for insurance companies, public health departments, and manufacturers of medical record systems and equipment.	Employers prefer graduates of approved 2-year associate degree programs as technicians. Clerks generally are high school graduates and complete 1 month or more of on-the-job training. Correspondence courses offered by the American Medical Record Association are available to those wishing to become clerks and to clerks seeking advancement to technicians. Those who pass an examination become accredited record technicians and often can look forward to more responsible positions. High school courses in science, health, typing, mathematics, and office practice are recommended to students interested in this field.	Medical record personnel must be accurate and pay attention to detail.
Operating Room Technicians	Operating room technicians, also called surgical technicians, assist surgeons and anesthesiologists before, during, and after surgery. Operating room technicians work in hospitals or other institutions that have operating room, delivery room, and emergency room facilities, and in the Armed Forces.	Most train for 9 months to 2 years in trade schools or technical institutes, hospitals, or community and junior colleges. Some train on the job for 6 weeks to 1 year. High school graduation generally is required. Some train in the Armed Forces. Operating room technicians may advance to assistant operating room administrator and assistant operating room supervisor. High school students interested in this field should take courses in health and biology.	Manual dexterity is important for handling instruments quickly. They may be required to work "on call" shifts, staying available to work on short notice.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Optometric Assistants	Optometric assistants perform routine eye care duties when optometrists test patients' eyes in order to prescribe corrective glasses. In a large office, assistants specialize; some handle visual training and others provide chairside assistance or administer the office. In a smaller practice, one person would do all these things. Most optometric assistants work for optometrists in private practice. Others work for health clinics and some serve in the Armed Forces.	Although most train on the job, employers prefer to hire graduates of 1- or 2-year training programs. High school graduation, including courses in mathematics and office procedures, is a preferred background for admission to a formal training program or on-the-job training. In addition, the U.S. Air Force offers accelerated 16-week training programs.	Because optometric assistants deal with instruments, manual dexterity and accuracy are important. Courtesy and tact are important in their dealings with patients. Hours may include weekend duty. Many opportunities for part-time jobs are available.
Radiologic (X-ray) Technologists	These workers operate X-ray equipment and take X-ray pictures (known as radiographs), usually under the supervision of a radiologist. Three specialties in this field include X-ray technology, the use of pictures of bones and inner organs of the body to detect abnormalities; nuclear medicine technology, the application of radioactive material to help diagnose or treat illness; and radiation therapy, the use of radiation-producing machines to give therapeutic treatments. Most work in hospitals. The remainder work in medical laboratories, physicians' and dentists' offices or clinics, Federal and State health agencies, and public school systems.	Completion of a 2- to 4-year post-high school program is required. Graduates of approved programs who pass an exam become registered with the American Registry of Radiologic Technologists, an asset in obtaining skilled positions. They then may be certified in radiation therapy or nuclear medicine by completing an additional year of training. Some technologists in large X-ray departments may qualify as instructors in X-ray techniques or advance to supervisory X-ray technologists. High school courses in mathematics, physics, chemistry, and biology are recommended to students interested in this field.	Full-time workers may be "on call" for emergency weekend or night duty. Most part-time jobs are in physicians' offices and clinics. Safety devices are used to avoid radiation hazards.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Respiratory Therapy Workers	These workers, sometimes called inhalation therapists, use special equiment such as respirators and positive-pressure breathing machines to treat patients who need temporary or emergency respiratory assistance. There are three levels of workers within the field: Therapists, technicians, and assistants. Therapists and technicians perform essentially the same duties, although therapists may teach and supervise. Assistants have little contact with patients and spend most of their time taking care of the equipment. Most work in hospitals. Others work for oxygen equipment rental companies, ambulance services, nursing homes, and universities.	Although a few train on the job, most workers complete post-high school programs ranging from 18 months to 4 years. A bachelor's degree is awarded for completion of a 4-year program and an associate degree for shorter courses. Respiratory therapists can advance to assistant chief, chief therapist, or, with graduate education, to college instructor. Technicians and assistants can advance to the therapist level by taking appropriate training courses. High school students interested in this field should take courses in health, biology, physics, and mathematics.	Mechanical ability, manual dexterity, and the ability to follow instructions and work as part of a team are important. After-hours and weekend duty generally is required. Adherence to safety procedures and regular testing of equipment minimize the fire hazard.
OTHER HEALTH OCCUPATIONS			
Dietitians	Dietitians plan and manage food service programs and advise on good eating habits. Over half work in health facilities of various kinds, including hospitals, nursing homes, and clinics. Others work in colleges and universities, schools, restaurants, cafeterias, large companies, and the Armed Forces. An increasing number work as consultants to hospitals, health-related facilities, and commercial enterprises including food processors and equipment manufacturers.	A bachelor's degree in foods and nutrition or institution management usually is required. The American Dietetic Association recommends completion of a 6- to 12-month internship or 1- to 2-year traineeship. Some undergraduate programs combine the educational and clinical experience in 4 years. Experienced dietitians may advance to assistant or associate director of a dietetic department. Advancement to higher levels in teaching, research, and other areas usually requires a graduate degree. High school students interested in this field should take courses in home economics, business, biology, health, mathematics, and chemistry.	Those in hospitals may work weekends while those in commercial food service have irregular hours.

Health Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Medical Record Administrators	These workers manage medical record departments and develop systems for documenting, storing, and retrieving medical information. They supervise and train medical record technicians and clerks, compile medical statistics, and help evaluate patient care and research studies. Most work in hospitals. Others work in clinics, nursing homes, State and local public health departments, medical research centers, and health insurance companies. Some work for firms that develop and print health insurance and medical forms, and manufacture equipment to record and process medical data. Some are consultants to small health care facilities.	A bachelor's degree in medical record administration usually is required. Those who have a bachelor's degree in another field and the required courses in the liberal arts and biological sciences may complete a 1-year certificate program. Medical record administrators with experience in smaller health facilities may advance to positions as department heads in large hospitals or to higher level positions in hospital administration. Some coordinate the medical record departments of several small hospitals; others take positions in health agencies; many teach in the expanding 2- and 4-year college programs for medical record personnel. High school students interested in this field should take courses in health, business, mathematics, and biology.	Part-time jobs are available in teaching, research, and consulting. However, a 36- to 40-hour week is usual.
Pharmacists	Pharmacists dispense drugs and medicines prescribed by medical and dental practitioners, and supply and advise people on the use of many non-prescription medicines. An increasing number of pharmacists serve as consultants to physicians, nurses, and other health professionals in matters relating to daily patient care. Most work in pharmacies. The rest work for hospitals, drug companies, government agencies, colleges of pharmacy, pharmaceutical and other professional associations, and the Armed Forces.	To qualify for the license required to practice pharmacy, one must graduate from an accredited college of pharmacy, pass a State board exam, and have a specified amount of experience or internship under the supervision of a registered pharmacist. At least 5 years of study beyond high school are required to become a pharmacist. One generally must complete at least 1 to 2 years of prepharmacy education and 3 to 4 years in a college of pharmacy. Teaching, research, or administrative jobs may require additional education. Pharmacists often begin as employees in community pharmacies. As they gain experience and the necessary funds, they may become owners or part-owners of pharmacies. Others may gain executive positions with chain drugstores, become directors of pharmacy service in hospitals, or advance in management, sales, and other areas in industry. High school students interested in this field should gain a strong background in the sciences.	Hours may include evenings and weekends. Pharmacists in community settings generally work longer hours than those in institutional settings, and self-employed pharmacists often work more hours than those in salaried positions.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Dispensing Opticians	Dispensing opticians, also called ophthalmic dispensers, accept prescriptions for eyeglasses. They determine the size and style of the customer's eyeglasses, write work orders for the technicians who actually grind the lenses, and adjust the finished glasses to fit the customer. Some specialize in fitting cosmetic shells to cover blemished eyes or in fitting artificial eyes. Most work for optical shops or department stores that sell prescription lenses. Others work for optometrists and ophthalmologists, in hospitals and eye clinics, or schools of ophthalmic dispensing.	Most learn through several years of on-the-job training. Formal training is available at community and junior colleges, and through 3- to 4-year formal apprenticeships. Some States have licensing requirements that generally include education and training standards and a written and/or practical examination. High school students interested in this field should take courses in physics, algebra, geometry, and mechanical drawing. The ability to do precision work is very important.	Many dispensing opticians go into business for themselves. Others advance by becoming managers of retail optical stores or sales representatives for wholesalers or manufacturers of eyeglasses or lenses. Those in retail shops generally work a 5½- to 6-day week.
Health Services Administrators	Health services administrators manage hospitals, nursing homes, clinics, and other kinds of health facilities. About half work in hospitals. The rest work in nursing homes, home health agencies, public health departments, and the Armed Forces. Some work in health planning agencies, or for management firms.	Educational requirements for this occupation vary widely. Entry jobs may require a 2-year associate degree, a bachelor's degree, or a master's degree. A Ph. D. usually is needed for teaching or research, and is an asset for more prestigious administrative jobs. Administrators of nursing homes must be licensed. Requirements are not uniform, but generally specify education and experience.	Health services administrators should be able to motivate people, direct large-scale activities, and enjoy public speaking. They advance by taking increasingly more responsible jobs. The ultimate goal in hospitals or nursing homes is the job of chief administrative officer. They often work long hours and may be called at any time in emergencies. Some travel may be required to attend meetings or inspect facilities.

Answers to Related Occupations

REGISTERED NURSE

1. b, 2. c, 3. b, 4. a, 5. a, 6. b, 7. c, 8. b, 9. a, 10. c.

MEDICAL TECHNOLOGIST

1. b, 2. c, 3. a, 4. b, 5. a, 6. c, 7. b, 8. a, 9. c, 10. b.

PHYSICAL THERAPIST

1. Art therapist, 2. Prosthetist, 3. Occupational therapist, 4. Chiropractor, 5. Speech pathologist or audiologist, 6. Music therapist, 7. Osteopathic physician, 8. Physical therapist assistant or aide, 9. Orthopedic surgeon, 10. Recreational therapist, 11. Dance therapist, 12. Occupational therapy assistant, 13. Respiratory therapy worker.

Social Scientists

Margaret Mead's field work in Samoa established her reputation as one of the world's foremost anthropologists.

Exploring Careers

Cleaning a specimen from a tar pit is painstaking work for this archeology student.

"Brian, come here! I found some coins!"

Shirley Margolis looked up delightedly from the long shallow trench she was digging in the desert. She was very hot and dusty but that was forgotten in her excitement over her find.

"That's great, Shirley," called Brian O'Shea, who was working in another trench a few yards away. "What a sight after all this time! I'll tell Dr. Berenson."

"Congratulations, Shirley," said the archeology professor a few minutes later. "I knew our perseverance would pay off. Before removing the coins, let's update our records and note the exact location of the find on our maps."

Dr. Berenson supervises an archeological team that has spent several months excavating a site in the Middle East, a fruitful area for archeological finds. Before beginning this excavation, the team from Western State University had a lot of background work to do. They wanted to select a site that would be likely to yield artifacts of earlier civilizations, and this took careful preparation. The team spent weeks examining the area, talking to local residents, poring over maps and aerial photographs, and digging test pits to sample the depth and contents of the soil. They also used electronic devices to help them determine what was underground.

Dr. Berenson's team of archeology students was searching for the remains of a civilization that had flourished in the area thousands of years ago. By studying what was left of these people's homes, tools, and clothing, the archeologists hoped to find out how they lived.

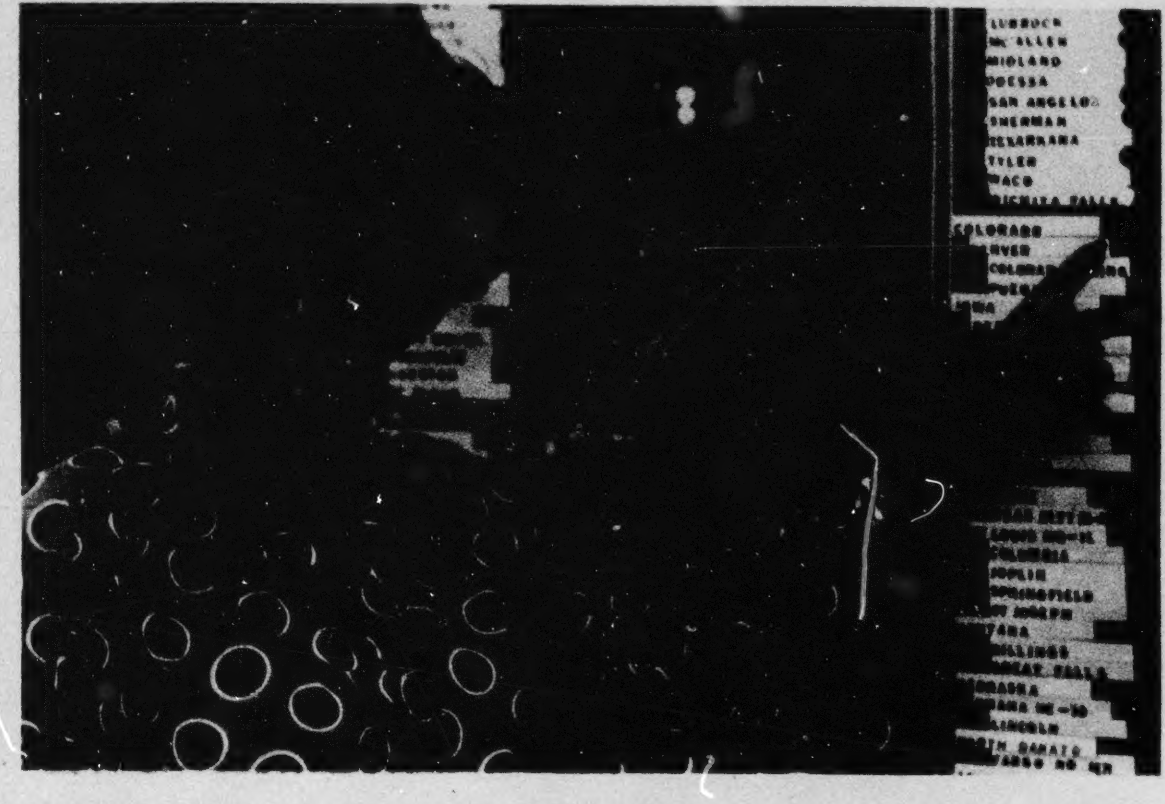
The work of archeologists on a dig involves slow, painstaking digging, scraping, and sifting. They examine every handful of dirt and use trowels, whiskbrooms, kitchen spoons, even toothbrushes to avoid damaging or destroying the evidence. There is an element of detective work in the conclusions archeologists draw from the artifacts they uncover. Pottery fragments may have to be fitted together to form a dish, for example. By comparing the size and shape and decorations on different dishes from the same site, archeologists can determine what these dishes were used for.

Careful recordkeeping and laboratory work are important, too. The coins that Shirley discovered must be cleaned, assigned a code number, and recorded in the excavation log. The exact place they were found must be noted. When the team finishes this dig, their records should be complete enough to enable them to reconstruct the site on paper. The examinations and tests they do here in the field laboratory—and back at the university a few months from now—will enable them to classify every object, determine how old it is, and decide what it was used for. The classification and dating techniques they use were developed through years of scientific research.

In their work, archeologists use the scientific method to study the past. Unlike historians, who work with documents and other written records, archeologists uncover and analyze physical evidence of cultures that existed long ago. They typically study such things as burial mounds, tools, weapons, ornaments, and home furnishings. Their purpose in reconstructing cultures that existed hundreds or even thousands of years ago is to find out how human culture changes over time.

Cultural change is of interest not just to archeologists but to all social scientists. Social scientists do research, teach, consult, and administer programs in a number of different fields: Anthropology, economics, geography, history, political science, psychology, and sociology. What all of them have in common is a professional interest in people and society. Social scientists study and describe human behavior and social institutions. You're already aware that the work of astronomers and physicists tells us a great deal about the universe and the planet earth. The work of biologists tells us about the

Social Scientists



Conducting a nationwide survey takes organizational ability as well as a knowledge of statistics.

plants and animals with which we share this earth. In much the same way, the work of social scientists tells us about ourselves.

Social scientists study our behavior in order to understand what makes us live the way we do. Such an understanding is essential for government leaders and others trying to develop policies and plan programs that meet our needs. Such dominant concerns of our time as equality of opportunity and the threat of a nuclear war, for example, require a better understanding of how our society works. As we learn more about the underlying causes of our problems, we are in a better position to do something about them.

Research is a basic tool of social science. Like other scientists, social scientists seek to establish a body of fact and theory that contributes to human knowledge and enables us to manage our affairs more rationally. Field work such as the archeological dig that Dr. Berenson is leading is a traditional method of gathering information or "data"—not only in archeology and anthropology, but in history and sociology as well.

Surveys are widely used to collect facts or opinions. Indeed, surveys are conducted by so many organizations for so many purposes, they are a familiar part of our daily lives. Literally thousands of polls, questionnaires, and surveys are going on here and abroad at any given moment. Political scientists use surveys to assess voting behavior; market researchers use them to determine what brand of toothpaste we prefer; economists use them to measure employment, unemployment, wages, and prices; demographers use them to detect changes in population patterns; educators use them to measure students' progress and see how well different teaching methods work.

Probably the greatest single change in the social sciences in recent times has been the widespread introduction of mathematical and other quantitative research methods. Calculus, for example, is used in economics, and algebra is used in anthropology and linguistics. Mathematics also provides the basis for the formal mathematical models used widely in economics and political science. We already have noted that surveys are used extensively to gather social science data. Survey methods

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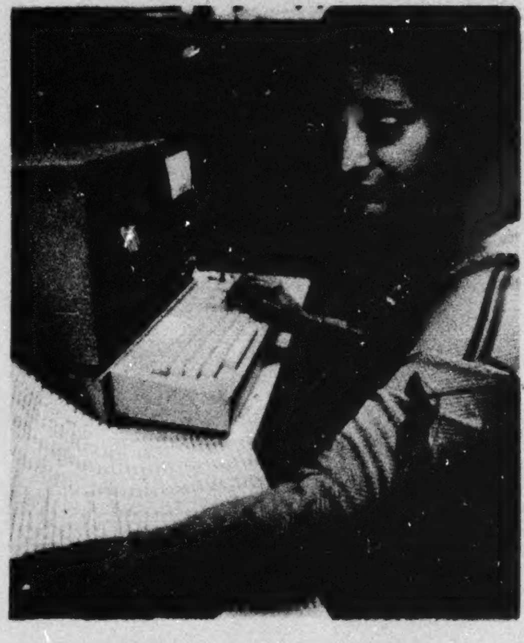
rely heavily on statistical concepts, and statistics has become an essential part of the training for most social science careers.

The computer is a staple of social science research and the ability to use computers for research purposes is a "must" for many social scientists. Because computers can handle vast amounts of data very quickly, social scientists are able to work with tremendous amounts of very detailed information about every conceivable aspect of human behavior. Researchers have at their fingertips an astonishing amount of information about our beliefs, opinions, attitudes, and lifestyles. Such information assists those concerned with finding solutions to our social problems.

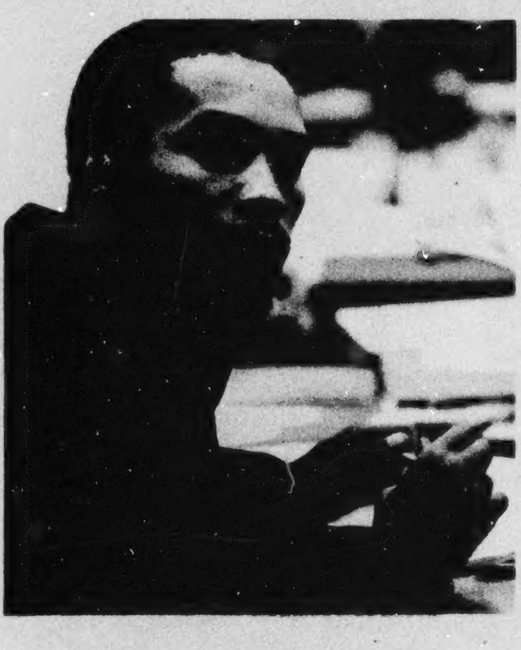
Now let's take a closer look at the kinds of work that social scientists do.

Anthropologists study the differences among people—differences in their physical characteristics as well as in their customs, behavior, and attitudes. They usually specialize in one of the four subfields of anthropology: Physical anthropology, archeology, cultural anthropology, and linguistics. *Physical anthropologists* are concerned with humans as biological beings. They study the evolution of the human body and look for the earliest evidences of human life. They also do research on racial groups and may, for example, explore the effect of heredity and environment on different races. Because of their knowledge of body structure, physical anthropologists are consulted on such practical matters as the sizing of clothing and the design of cockpits for airplanes and spacecraft. *Archeologists* like Dr. Berenson usually study cultures that no longer exist by digging out and examining tools, clothing, and other evidences of human life. *Cultural anthropologists* study the customs, culture, and social life of living peoples. Traditionally, they have been concerned with primitive tribes and peasant societies, but increasingly cultural anthropologists are turning their attention to social patterns in modern settings and studying the behavior of drug addicts or corporate executives, for example. *Linguists* study the role of language in various cultures. Their research tells us, for example, that the way people use language influences the way they think about things. Thus language itself helps explain some of the differences among groups.

Economists study the way we use our resources to produce goods and services. They compile and analyze data that help us understand the costs and benefits of making, distributing, and using things the way we do. Some economists are primarily theoreticians. They may develop theories to explain the causes of inflation, for example, through the use of mathematical models. Others deal with practical matters such as business cycles, tariff policies, tax policies, farm prices, or unemploy-



The ability to use computers for research purposes is important for many social scientists.



An authority on the corrections system, this psychologist is testifying on prison conditions.

Business economists like this one use math to forecast future sales.

These geographers are working up suggestions for supermarket locations in and around a large city.

ment. They use their understanding of the way the economy works to advise government officials, business firms, insurance companies, banks, industry associations, labor unions, and others. The work that economists do affects us directly, too. Government economists in the Bureau of Labor Statistics, for example, issue monthly figures showing how much the prices of goods and services have changed over time. On the basis of these figures, known as consumer price indexes, cost-of-living increases are granted to social security recipients. Business firms and labor unions use these indexes in negotiating wages.

Economics is such a large and complex field that nearly all economists specialize. *Business economists* analyze and interpret government policies and actions that are likely to affect the firm they work for. They commonly prepare economic forecasts and then explain how their forecast applies to various aspects of the business, such as marketing, purchasing, industrial relations, and finance. They also advise on the internal operations of the firm, applying their knowledge of economic principles to such practical problems as inventory levels and pricing policies. Other kinds of economists include *agricultural economists, financial economists, industry economists, labor economists, international trade economists,* and *tax economists.*

Geographers are primarily concerned with space and the way we use it. They try to understand and explain why people, things, and activities are located where they are. Their studies help to explain changing patterns of human settlement—where people live, why they live there, and how they earn a living. Because geographers are concerned with why people settle where they do, their work touches upon economics, politics, culture, health, and other aspects of society. Their work has numerous practical applications. A geographer doing flood plain research might advise inhabitants of the probability of a flood and tell them how urgent it was to take precautions. Another geographer might advise a supermarket chain on store locations. Still another might consult with officials of a foreign government concerning the need for an irrigation project.

Like other social scientists, geographers apply their knowledge in a variety of areas. *Economic geographers* study proposed locations for business or industrial firms and make recommendations. *Urban geographers* study cities and make suggestions concerning transportation, housing, parks, and sites for industrial plants. *Cartographers* compile and interpret data on the physical environment and make maps and charts. *Medical geographers* study the effect of the natural environment on health and take into account such factors as climate, vegetation, mineral traces in water, and air pollution.

Exploring Careers

Historians study past events, institutions, ideas, and people. Some historians specialize in a particular period of time—18th century history, for example. Others explore the history of a subject such as economics, philosophy, science, religion, art, or military affairs. Although many specialize in the social or political history of the United States or Europe, a growing number are concerned with the history of Africa, Latin America, Asia, or the Middle East—areas of great importance in our lives. By putting international issues in proper historical perspective, historians can be instrumental in increasing understanding and respect among the nations of the world. Because of historians' insights into what happened in the past—and why—the President and Congress sometimes consult them when they formulate domestic or foreign policy.

Traditionally, most historians have taught and done research in colleges and universities. Publishing is very important in the academic world, and historians spend much of their time doing research and writing scholarly books and articles, textbooks, and publications on historical subjects for the general public. Depending on their specialization, their research might take them to records kept in a county courthouse, an old church, a State legislature, or the National Archives.

Historians do many things besides teach, however. They administer historical activities in archives, museums, historical societies, and places such as Mount Vernon and Independence Hall. This involves helping scholars to use manuscripts and artifacts and educating the public through exhibits and publications. Many historians preserve, identify, and classify historical documents, treasures, and other materials. A growing number are concerned with the restoration of historic buildings and sites. Their goal is to preserve and interpret our historical heritage, which consists of historic houses, churches, forts, public markets, battlefields, and other places. Historians are employed to manage, interpret, and write about such places as the Manassas National Battlefield Park in Virginia and Old Sturbridge Village in Massachusetts. Historic preservationists also work to save city neighborhoods and maintain their unique historic and architectural features. This usually means joining forces with architects, lawyers, planners, business and community leaders, and city officials.

Political scientists study the objectives, organization, and actual operations of government in the United States and abroad. They explore such areas as public opinion; the nature of political parties; the influence of special interest groups; the workings of the Presidency, Con-

Volunteers are helping an archeological team expose the foundations of a canal.

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gress, and the judicial system; political decisionmaking at the State and local levels; the role of the United States in world affairs; mass movements, revolution, and ideology; community organization and urban politics; and policy studies.

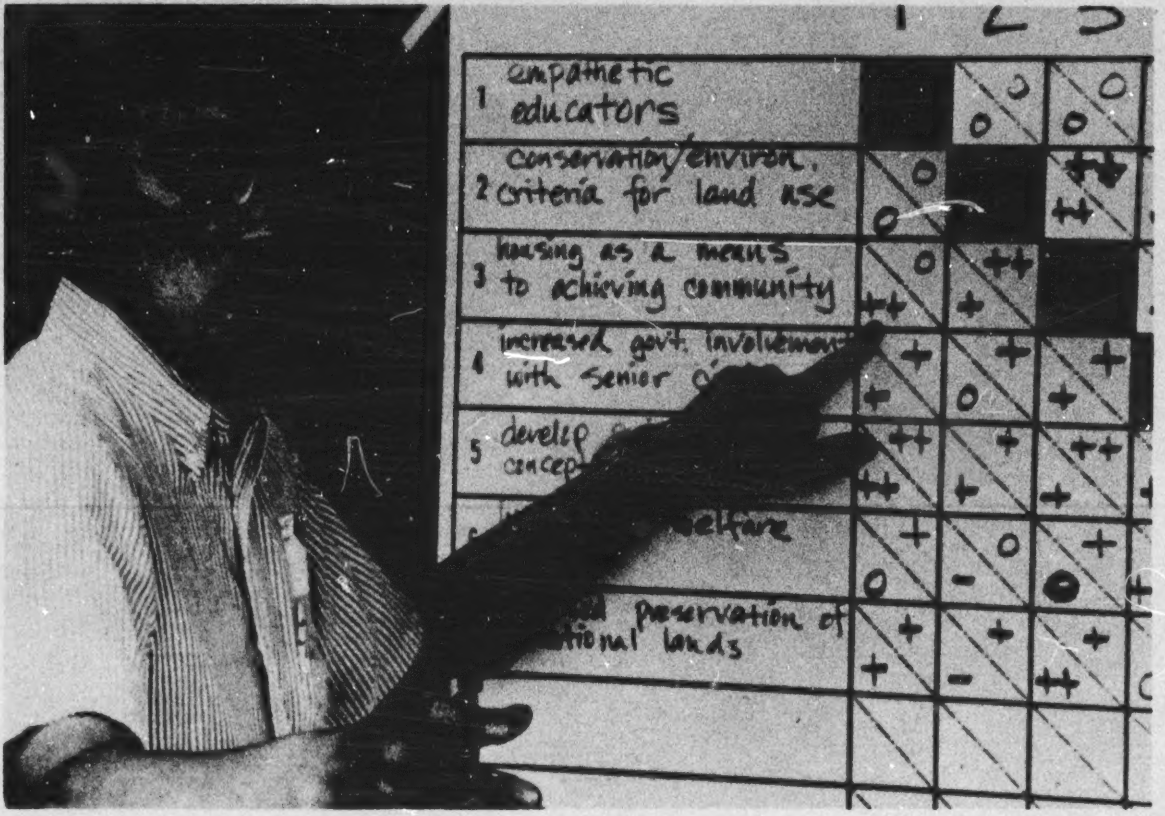
Most political scientists teach or do research at colleges and universities. Very often, they do consulting work as well. Some political scientists are employed by public interest groups, survey research institutes, and foreign affairs organizations; they do research, prepare publications, and consult. Others work as aides to elected officials, serve on the staff of committees of Congress and State legislatures, and work for legislative bodies in cities and counties. Still others administer government programs.

Because of their understanding of the political process and how it really works, political scientists are often asked to give advice and make recommendations. Business firms, labor unions, citizens' groups, political candidates, and government agencies themselves all seek the advice of political scientists from time to time. Political scientists, like other social scientists, provide opinions only after a careful study of the matter at hand—which might be anything from "Which party will win the election in the 8th precinct?" to "What effect will this treaty have on our position in the United Nations?" To find the answers, political scientists begin by gathering information. They may examine documents, conduct a survey, or interview people to get the information they need. Then they carefully weigh all the facts and arrive at a conclusion.

Psychologists study people in order to understand and explain their actions. Psychologists' insights into human behavior enable them to help people who are mentally or emotionally disturbed or deeply unhappy. *Clinical psychologists* work with people who have mental or emotional disorders. They learn more about their pa-

Volunteer campaign work is a good way to launch a career in politics.

Many social scientists have teaching or research positions with colleges and universities.


1 2 3
1 empathetic educators
2 conservation/environ. criteria for land use
3 housing as a means to achieving community
4 increased gov't involvement with senior
5 develop concep
welfare
preservation of tional lands

This sociologist is advising county officials on the things they need to consider when they plan for future growth.

tient's frame of mind by giving standardized tests and taking a personal history, but mostly they help by talking to the patient and listening. They counsel their patients, individually and in groups, and try to help them deal with their problems.

Some psychologists specialize in the behavior of people in a particular place. *School psychologists* help with learning and social problems in schools. *Industrial psychologists* might study the reasons a company's employees are absent from work so much. They would also work with the company's personnel department on selection and training procedures, and might counsel employees who were unhappy or depressed.

Social psychologists usually do research, administer programs, or teach. They examine such issues as leadership and group behavior. Sometimes their research is designed to find out how well government programs are working. This is called evaluation research, and is an important field of social science research. There are other kinds of psychologists, too, including *developmental psychologists, educational psychologists, experimental psychologists,* and *comparative psychologists.*

Sociologists analyze society and human behavior by studying people in groups. They are interested in human interaction as such, and explore such social processes as competition and cooperation. In their research, sociologists may work with groups as different as families, tribes, communities, and governments. Or they may work with social, political, religious, ethnic, business, or professional groups. For example, a sociologist might study families to discover the causes of social problems such as crime, juvenile delinquency, alcoholism, and poverty. Sociologists apply their knowledge of people's behavior in groups in many areas including family counseling, public opinion analysis, education, law, religion, public relations, and planning.

Most sociologists teach and do research in colleges and universities. Others, however, are employed by research organizations to conduct studies and prepare reports. Still other sociologists administer programs in such fields as corrections, mental health, social welfare, and education.

Areas of specialization in sociology include *social organization*, which deals with the origin, development, activities, and interaction of social groups; *urban sociology*, which deals with life in cities and highly populated areas; *criminology* and *penology*, which deal with the causes of juvenile deliquency and crime and the life of inmates in penal institutions; and *demography*, which deals with the composition, growth, and movement of populations.

Personal Characteristics

What makes a good social scientist? They are scientists, after all, who seek knowledge and apply it to a variety of social needs and situations. Therefore, two fundamental traits needed by all social scientists are *intellectual curiosity* and *creativity.* Social scientists must constantly seek new information about people, things, and ideas. Their curiosity inspires them to devote their lives to understanding the causes of social problems. History, geography, and economics can all be taught, but creativity cannot be. Successful social scientists have it, however, and use their creativity to attack social problems in new ways. Although social scientists study the work of others before them, they constantly face problems that require original solutions.

Social scientists must be willing to spend considerable time and effort in study and research. This requires a number of personal traits. For example, an economist who is studying tax reform needs the *ability to analyze data* on the proportion of total taxes paid by people at different income levels. A political scientist who is studying the differences between democratic forms of government and dictatorships must have the *ability to think logically and methodically* about what influences the actions of government leaders. A psychologist who is studying the behavior of mice over a period of months must have *systematic work habits* if he or she expects to reach valid conclusions. *Objectivity* and *open-mindedness* are important in all kinds of social science research. An economist must be able to make an unemotional and detached analysis of the issues when reviewing a proposal to amend a city's rent-control legislation. *Perseverance* is essential for an anthropologist who might spend years accumulating and piecing together artifacts from an ancient civilization.

Social scientists must apply their research findings to practical situations. This requires other traits. For example, a sociologist who is preparing a report on the causes of juvenile delinquency needs *intellectual creativity* to approach the problem from a new perspective. A historian who is delivering a lecture on regional differences in American social customs needs the *ability to communicate effectively.* This historian must be good at public speaking, of course. The ability to handle written material is just as important. Because communicating their findings and analyses to other people is such an important part of the job, social scientists must be able to speak and write clearly, concisely, and effectively. The written report is the standard form of communication in the social sciences, and the ability to prepare a well-organized, well-documented, and well-written report is a "must."

Economists develop the Consumer Price Index, a measure of inflation.

For some social scientists, *emotional stability* is important. A clinical psychologist who is working with a group of mental patients must understand other people and be sensitive to their moods. The manner in which he or she conducts himself is important, because psychologists often serve as models for their patients.

For other social scientists, *physical stamina* is important. An anthropologist or geographer doing field work may have to lift equipment, walk considerable distances, or spend a long time in uncomfortable surroundings.

Some social scientists *work alone.* An economist who studies imports and exports may spend most of his or her time behind a desk, with only a calculator for company. The job involves analyzing statistics and preparing tables and charts.

Other social scientists *work as part of a team.* The archeological team led by Dr. Berenson is learning how important it is to work together. Teamwork is important, too, because studies of social problems often require the skills of people from several disciplines. Thus a sociologist might head a study group on prison conditions consisting of a lawyer, a social worker, and a corrections official.

Training

Formal training requirements for seven social science occupations are described in the Job Facts at the end of this chapter.

High school offers you a good opportunity to get the background you'll need for further training. History, geography, economics, and other social studies courses are, of course, very important. You also should take as much mathematics as possible. Social science research increasingly requires knowledge of mathematics, statistics, and computer science, and a strong mathematics background will prepare you for more advanced courses in these fields later on. English courses are valuable, too, since communications skills are so important to social scientists. Your high school probably offers other courses that would relate to some of the social science occupations. For example, biology, physics, and other sciences are very important for some geographers, anthropologists, and psychologists. Drawing and design are important for cartographers.

Most of your training would occur after high school. Social scientists generally earn a bachelor's degree after 4 years' study in college, and then go on to graduate school. Teaching or research in a college or university almost always requires a Ph. D. degree. The Ph. D. is important for many nonacademic positions as well. And it is essential for recognition as a scholar in your chosen field.

Nevertheless, many persons with a bachelor's or master's degree in economics, geography, and other social sciences are working successfully in their chosen field. It's important to remember that a college degree in one of the social sciences can prepare you for graduate or professional education in law, business, journalism, and a number of other fields. Moreover, it gives you the background you'd need for many kinds of jobs in business, industry, and government.

Training does not end when you earn a college or graduate degree. New theories and new research findings emerge so often that what you learn in college soon will become outdated—though not useless. Just as you can expect to learn new words your whole life, social scientists continue to learn new theories and applications their entire lives. They learn by reading books and magazines, going to conferences, and attending seminars from time to time. Careers in this cluster are for people who like to learn outside as well as in school.

A Final Word

If you have a strong interest in social issues, don't stop here! Other chapters of *Exploring Careers* describe several more occupations that are worth looking into.

Urban planners share the historic preservationist's concern with preserving the interesting and distinctive qualities of buildings and neighborhoods. In fact, planners and historians often work together to preserve historic sites and communities. A story about a planner appears in the chapter on Office Occupations.

Cartographers can use data from satellite sensors to make maps.

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Social Scientists

Are you caught up in current events? Do you think you would like to be one of the people investigating local or national issues and informing the public of what's really going on? There's a story about a newspaper reporter in the chapter on Performing Arts, Design, and Communications Occupations.

Social workers devote their lives to helping people. Some do research to identify community needs. They work with health, housing, transportation, and other planners to suggest ways of making our communities better places to live. A story about a social worker appears in the chapter on Social Service Occupations.

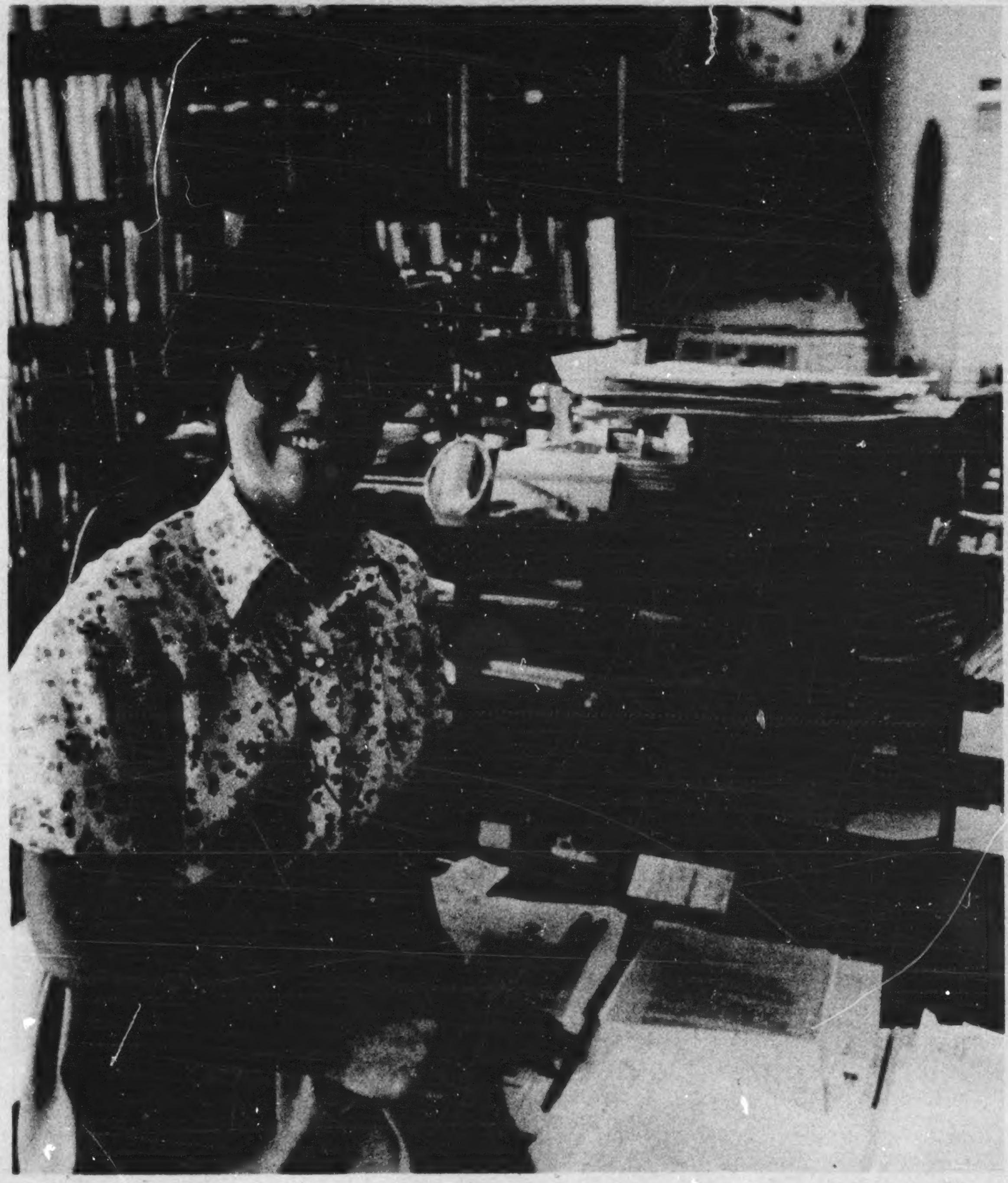
Are you fascinated by the workings of the financial world? Bank officers and securities sales workers handle their clients' money and are just as concerned with understanding why the economy works as it does as economists are. Training in economics is important for these workers. A story about a bank officer appears in the chapter on Office Occupations. A day in the life of a securities sales worker is described in the chapter on Sales Occupations.

The level of education in any society is one indicator of the standard of living. Teachers devote their lives to educating people to fulfill their own potential and become productive members of society. Many people with training in history, geography, and other social sciences become teachers. A story about a secondary school teacher appears in the chapter on Education Occupations.

You've learned that computers are an important research tool for social scientists. If the field of computer science fascinates you, learn more about computer occupations by reading the story of the programmer/systems analyst in the chapter on Office Occupations.

This psychologist is doing research on eye movements.

Museum Curator



Jill's love of history inspired her to look for a job as a museum curator.

Social Scientists

Jill rounded the corner sharply, the gravel from the dirt road flying in all directions as her sports car sped by. She was on her way to a country antique show and wanted to get there before dark.

Jill Winitsky is the curator of engineering at the Wood Museum. She considers herself lucky to be working at a large museum such as the Wood, where she can concentrate on engineering history—her area of expertise. Curators at the Wood Museum generally specialize; their subject may be agriculture, textiles, mining, atomic energy, or political, cultural, or military history.

Jill had come across the notice of the antique show in the morning newspaper and thought it seemed worth looking into. Not that she was counting on finding anything at the show. Jill had gone to a number of antique shows in the 5 years she had worked at the Wood Museum but she rarely found anything worth acquiring. Generally the museum relies upon gifts—of historical objects and of the money to purchase them.

"It's a nice drive," thought Jill as she spotted the turnoff to the grange hall where the antique show was being held. "And you never know, of course. Maybe I'll be lucky for once and find something worth adding to the museum's collection."

Only a few people were there when Jill walked into the hall where the antiques were being shown for sale. She paused for a moment to get an idea of the layout. Then she moved purposefully into the exhibit area, carefully noting each object on display. Something in the center of the room made her stop in her tracks. It was an old rotary printing press, the kind consisting of a large cylinder bearing columns of type and several small cylinders. The black metal press was somewhat worn; a number of cracks were visible. But otherwise it was in fair condition.

Jill estimated that the press was about 70 years old. Considering that the rotary printing press had only been invented in the mid-19th century, this press was well worth acquiring. Of course the museum had several other printing presses in its collection, but Jill was excited at the prospect of getting this particular press, which probably had been made shortly before the manufacturer went out of business.

Jill didn't lose any time locating the manager of the antique show.

"Mr. Williams, I am Jill Winitsky, curator of engineering at the Wood Museum," she said by way of introduction. "I am interested in acquiring that old printing press for the museum. Can you put me in touch with the owner?"

"Mrs. Cortland owns the press," Mr. Williams replied. "You could probably reach her tomorrow morning." He handed Jill a business card that read: Mrs. Virginia Cortland, 544 West Lorch Street, Telephone 345-6111.

Jill called Mrs. Cortland right after she arrived at work the following morning. She explained her interest in the press and suggested that she and Mrs. Cortland get together to talk about it some more. Mrs. Cortland agreed, but reluctantly. She made it clear that she really wanted to sell the press.

"The press is something my late husband acquired a long time ago out west," Mrs. Cortland explained. "We kept it in the basement. But now I am moving to an apartment and I don't want to take it with me. It seemed like a good idea to sell it."

"I see," said Jill. "However, I'd really like the chance to talk with you about the press. How about coming to the museum tomorrow? We could have lunch here and talk about it then."

After lunch the following day, Jill gave Mrs. Cortland a tour of the engineering section and gave her a brief but lively history of the printing press. She explained the historical significance of the press that had been in the Cortland basement all these years. Mrs. Cortland's resistance began to fade. Nevertheless, it took several more conversations before she agreed—enthusiastically, at last—to donate the press to the museum.

Now, every time Jill walks through the exhibit on printing technology, she remembers the antique show at the end of a country road and innumerable conversations with Mrs. Cortland.

Jill was born and raised in the oldest house in Macon County, Georgia, and has been interested in history since she was a girl. Genealogy in particular fascinated her when she was growing up, and she thought nothing of spending hours and hours poring over records of her family's history in the county courthouse. She also developed an extensive correspondence with other genealogy buffs.

Much as she loves her job, Jill hadn't planned to become a museum curator when she was in school. Nonetheless, her background suits her for the job very well. She finished college with a double major in history and engineering. That is, she completed the college work for a bachelor's degree in both history and engineering. She also has a master's degree in history. Curatorial jobs are relatively few and far between, Jill knows, and she considers herself lucky to be in a job that she likes so much. She realizes, too, that she'd probably need a Ph. D. to be hired at the Wood Museum today.

Jill spends much of her workday dealing with letters and telephone calls. One recent letter began, "I am writing a book to be called *Tunneling Through Solid Rock*, and I need photographs of several different kinds of tunnels for the book. Can you supply them?" Jill usually can help with this kind of request; she checks the museum's extensive photograph file and selects those that will fit the author's needs.

Just a few days ago, she received a letter from the director of a historic preservation society. The society plans to restore an old grist mill and wanted to know if Jill could give them some advice. Restoration work is something Jill particularly enjoys, and she's even had some experience with grist mills. She'd like to take on this project, but the mill is nearly 100 miles away. The trips back and forth would keep her away from the museum too much. Jill wrote back, referring the society to several books on the subject and giving them the name of another authority who might be willing to help.

The grist mill restoration had been tempting. But it really was out of the question since Jill had been away so much on that steel plant project. That request had come through several months ago. The mayor of a nearby city had written, "We have an old steel plant that has not been in operation for many years. The city council joins me in believing that the structure might have some historical value and they are considering allocating funds to restore the plant and make it a historic site. We would appreciate it if you would examine the structure and give us your opinion. May we expect to hear from you soon?" That request had led to an inspection trip, and then several return trips, as Jill was called upon to testify before the city council and then speak at a town meeting to explain the plant's historic significance.

Today's paperwork taken care of, Jill turns to the exhibit on industry in 19th-century America that she's been working on for nearly a year. The exhibit will open next summer in a newly renovated wing of the museum. It will include early industrial machinery, handtools, company records, and many other items. Putting together an exhibit is a big job, one that involves an almost overwhelming amount of detail. Jill has acquired items from literally hundreds of sources: Other museums, historical societies, archives, private collectors, antique dealers, and manufacturing firms. Much of her time has gone into the search for historically significant items and negotiations with the owners for their acquisition. Documenting every item has been a tedious, time-consuming task. Now she's busy preparing the catalog that will be published when the exhibit opens.

As a curator, Jill is concerned with educating and informing the public. She contributes articles on her section of the museum to *Wood Light*, a monthly newsletter that is sent to members of the museum. The new printing press, for example, will make a good subject for a short article. From time to time, she conducts special tours for dignitaries, reporters, students, and other special groups. Normally, of course, museum tours are conducted by the Wood's volunteer guides. Jill is one of the curators who help train the volunteers. Not long ago, Jill gave a talk on the history of textile manufacturing in New England during the intermission of a weekly concert sponsored by the museum and broadcast over a local radio station.

"I consider myself very lucky," says Jill. "Museum jobs are hard to find."

Doing research and keeping up with recent developments in her profession are important parts of Jill's job. Last year, she devoted quite a bit of her free time to research on textile mill restoration. That was the subject of a paper she presented at the annual meeting of State historians.

Jill enjoys her work. She particularly enjoys seeing the way some people become totally absorbed in one of her exhibits and lose all track of their surroundings. Jill is proud, too, of being able to maintain and restore structures that are part of the region's historic heritage. Nevertheless, she feels the pressure when she faces the deadline for opening an exhibit, completing a research report, or making a speech. The job has built-in frustrations, too. Just recently, for example, she lost a chance to buy a very old drill press because the museum didn't have the funds.

Jill's job demands a commitment. She is expected to complete original research projects that require night and weekend work. She must be "constructively aggressive" in always being on the lookout for objects of historic value. She often attends auctions and flea markets in this never-ending search. Even while she's on vacation, Jill takes time to investigate leads for new exhibit items. She knows that casual conversations can lead to major acquisitions. Because Jill finds her job so interesting, she doesn't mind giving so much of her time to it. As a curator, she's doing something that she very much wants to do.

Exploring

Curators must have a strong interest in history.

- Do you look forward to history class?
- Do you do extra reading on historical topics?
- Do you enjoy visiting historical sites?
- Are you interested in genealogy—learning about your family history?
- Are you interested in historic preservation projects in your community?
- Are you interested in the history of your part of the country?

Curators need to do careful research and think logically and analytically in order to explain the origins and uses of the objects in their collections.

- Do you check the facts before deciding whether something is so?
- Do you ask questions in class? If you don't understand the answer, do you keep asking until you're sure it's clear?
- Do you look up words you don't know in the dictionary?
- Do you use the encyclopedia?
- Do you do research on subjects of personal interest?
- Do you check your answers before you turn in a test paper?
- Do you like to solve puzzles, riddles, and brain teasers?

Curators must be objective and exercise good judgment in selecting items for the museum's collection.

- When preparing a report for school, do you include all relevant information regardless of your own point of view?
- Are you interested in hearing all sides of an issue?
- Can you tell when someone has a biased viewpoint?

Curators must have an aesthetic sense to arrange exhibits in an appealing manner.

- Do you notice your surroundings?
- Can you name some of the things that make a room, a building, or a neighborhood pleasant to look at? Can you name things that make it unpleasant or even ugly?
- Do you have a flair for decorating?
- Do you have good taste in selecting clothes?
- Can you fit a great deal into a relatively small area without having things look cluttered?

Curators must set priorities because museums have limited budgets.

- Are you good at getting all the facts and weighing them carefully when you make a big purchase—a bicycle, camping gear, or stereo equipment, for example?
- Are you aware of making choices about the way you use your time when you decide to go to a party instead of studying for a test?

Curators must be persuasive in order to convince potential donors to contribute time and money to the museum.

- Are you good at getting your point of view across?
- Are you persuasive?
- Is it easy for you to persuade your friends to work on school or extracurricular projects with you?
- Are you good at collecting contributions for school or community benefits?

Curators must be effective communicators. They write letters and reports, give speeches, and spend a great deal of time on the telephone.

- Are you good at writing term papers and compositions for school?
- Are you good at doing essay questions on tests?
- Do you enjoy writing letters to friends?
- Do you write poetry or short stories in your spare time?
- Are you good at crossword puzzles, Scrabble, Password, and other word games?
- Are you good at giving oral reports?
- Do your friends ever ask you to speak on behalf of a group—at a club meeting or going-away party, for example?

Exploring Careers

Suggested Activities

Volunteer to work in a museum during the summer or after school. Talk to the curators about their work. Get a feel for the museum environment.

Visit a museum in your community. Arrange for a guided tour. Observe the way in which exhibits, publications, and such educational programs as lectures, films, and workshops all carry out the focus of the museum—art, natural history, science and industry, or another subject.

Join a local archeological or historical society. Find out if there are organizations in your community actively concerned with historic preservation.

Invite a curator, art conservator, or other museum worker to speak to your class. Ask the speaker to talk about job duties, training, and the rewards and frustrations of the work. Arrange for a demonstration of historic preservation techniques if possible.

Ask your teacher to arrange a class tour of a historic landmark in your State. There are historic landmarks throughout the country: Colonial communities in the East, plantations in the South, the French sector in New Orleans, Spanish missions in the Southwest, Indian and pioneer settlements in the West. In addition, almost all State capitals have buildings of historical importance, as do many older college campuses. Contact your State historical society, State travel commission, or local chamber of commerce for more information about historic landmarks near you.

Use school assignments and activities to strengthen your knowledge of history and its relevance to our lives. Join the history club in your school. Take as many history courses as possible. Ask your history teachers to suggest research projects. Read about historical topics that interest you.

Use a historical subject or issue as the basis for a project in a social studies or English class.

- Do research on a historic building in your area. Find out when it was built and determine what uses it's been put to since then. For help with your research, try the public library, your local historical society, or the planning department of your local government.
- Prepare a report on the history, folklore, culture, and current situation of an American Indian tribe. If you were arranging a museum exhibit about this tribe, what items would you include?
- Make a poster that shows the place of origin and period of arrival of immigrants to the United States. Choose one country and show how some of the ideas, customs, and names of people from that country have become part of American life.

Explore your genealogy. To get started, ask the assistance of your parents and relatives. Begin by interviewing your parents, grandparents, and other members of your family. Later on, you'll want to track down certificates of births, deaths, and marriages, and deeds, wills, and records of real estate transactions. Your history teacher and local historical society can offer suggestions on where to start looking for records such as these.

Join the staff of your school newspaper. Writing is an important skill for museum curators.

Collect and mount at least one coin for every year as far back as possible.

Collect and mount stamps from various countries. Show how to use stamp catalogs. Demonstrate how to use a perforation gauge to figure perforation measurements, a watermark detector to identify stamps, a magnifying glass to study their design and condition, and tongs and hinges to mount stamps in an album.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops may also offer opportunities to test career interests through internships, service aide and community action projects, and proficiency badges in a number of areas including Stamp Collecting, World Heritage, and My Country.

If you are a Boy Scout, try for merit badges in Genealogy, Coin Collecting, and Stamp Collecting.

Write for information on museum careers to the American Association of Museums, 1055 Thomas Jefferson Street, N.W., Washington, D.C. 20007.

Write for information on careers as a historian to the American Historical Association, 400 A Street, S.E., Washington, D.C. 20003, National Trust for Historic Preservation, 1789 Massachusetts Ave., N.W., Washington, D.C. 20036, and American Association for State and Local History, 1400 Eighth Avenue South, Nashville, Tennessee 37203.

Related Occupations

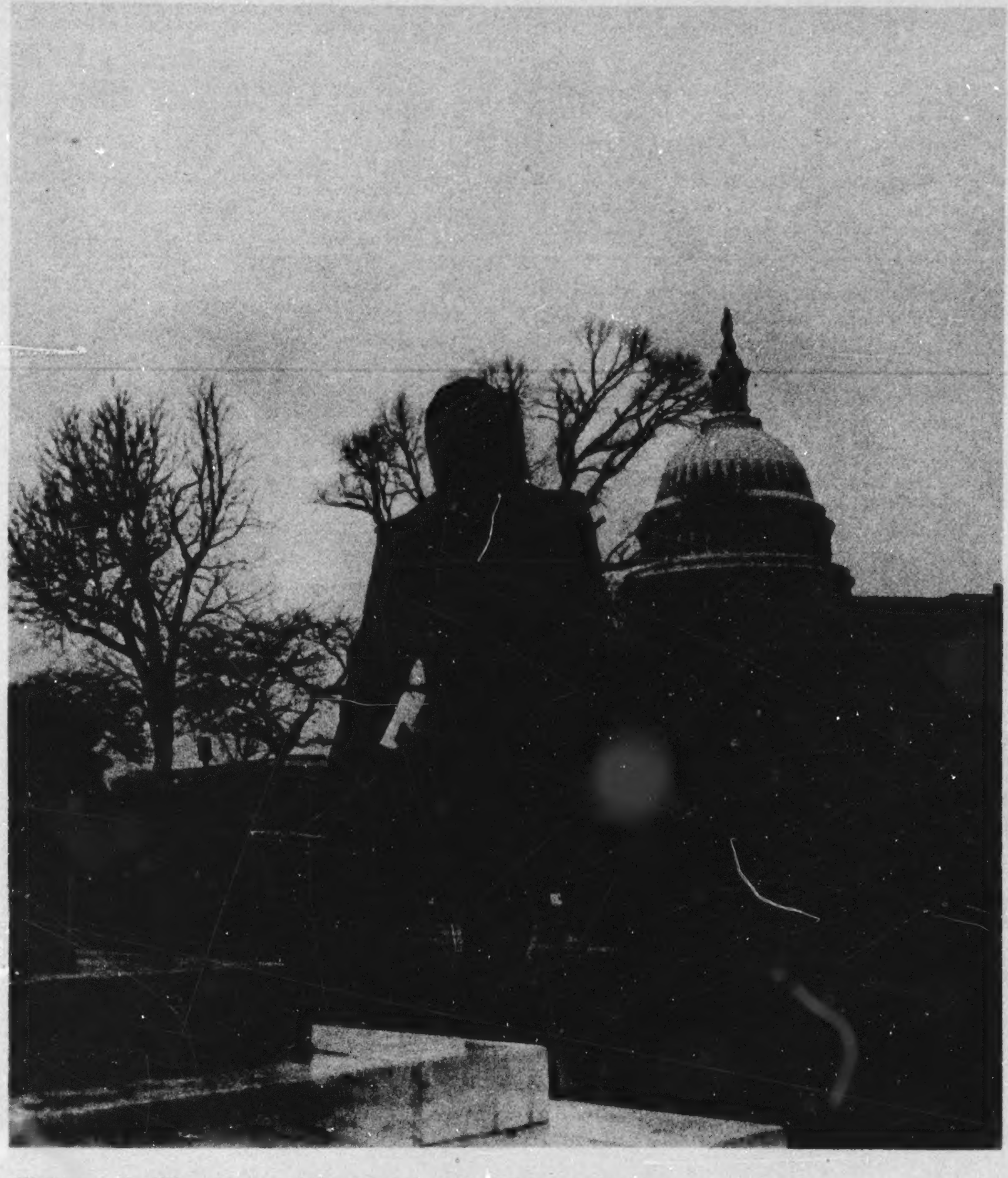
Museum curators are not the only workers concerned with history and historic preservation. The functions of other workers in this field are described below. Match these functions with the job titles listed at the end.

1. I write about the careers or lives of famous people. I get information from diaries, news accounts, personal correspondence, relatives, and business associates of my subjects. Who am I?
2. I evaluate, classify, and maintain historically valuable materials including government records, letters from famous persons, charters of organizations, maps, motion pictures, and still pictures. I write descriptions of materials so that people will know what is available and how best to make use of it. Who am I?
3. I prepare items for museum collections and exhibits. I use electric drills, chisels, plaster, glue, and many other tools and materials. Who am I?
4. I clean, reweave, and mount ancient textile and lace materials for display in textile museums. Who am I?
5. I repair and clean art objects such as pottery, etchings, and tapestries to restore them to their natural appearance. Who am I?
6. I try to identify the ancestors of a family or individual. I consult many kinds of documents including records of births, deaths, and marriages. Who am I?
7. I try to reconstruct the history and customs of cultures that no longer exist. I study the remains of homes, clothing, and other evidences of human life recovered by excavation. Who am I?
8. I supervise workers who repair and conserve art objects. I examine art objects using X-rays and special lights to determine their authenticity, need for repair, and the best method of preservation. Who am I?
9. I restore and prepare exhibits of medieval arms and armor such as helmets, guns, and swords. Who am I?
10. I clean, retouch, and remount damaged and faded paintings. Who am I?
11. I direct the activities of people involved in investigating and preserving historic homes, battlefields, and other landmarks. We prepare brochures, exhibits, maps, and photographs to encourage people to visit historic sites. Who am I?
12. I determine the best way to pack, transport, and store valuable historic items to minimize damage and deterioration. Who am I?

Art conservator
Supervisor, historic sites
Conservation technician
Paintings restorer
Restorer, lace and textiles
Fine arts packer
Museum technician
Armorer technician
Biographer
Genealogist
Archivist
Archeologist

See answers at end of chapter.

Political Aide



"Working on the Hill pays reasonably well and I make important contacts," says Bruce, "but I am tied hand and foot to the job."

Bruce Yamasaki usually arrives on Capitol Hill in Washington, D.C., well before 8 o'clock in the morning. As administrative assistant to Pearson Boyne, a U.S. Senator, Bruce must be on the job whenever Senator Boyne is. When Congress is in session, about two-thirds of each year, Bruce works well into the evening—until 8:00 or later. Senator Boyne, the senior Senator from his State and a member of the Foreign Relations and Governmental Affairs Committees, often attends committee meetings in the morning and participates in business on the floor of the Senate in the afternoon.

When Congress is not in session, Bruce meets with representatives of political and business groups and with the Senator's staff. He frequently visits Senator Boyne's home State to get closer to the Senator's constituents—to learn their needs and their sentiments on bills being considered by the Congress. If the issue is a particularly sensitive one, Bruce may decide to poll the Senator's constituents, using questionnaires mailed to every voter in the State.

Bruce lives and breathes politics; he always has. Political campaigns and elections have interested him since he was a youngster. Bruce has an excellent background for this position. His credentials include a bachelor's degree in political science, followed by several years' experience as a journalist covering local politics for a big city daily. Perhaps most important of all, Bruce has practical experience in government and politics. As a teenager, he worked on local political campaigns. The heady, hectic months of campaigning meant stuffing envelopes, putting up posters, delivering messages, anything at all that needed to be done. Bruce became so wrapped up in politics that he stayed on as a volunteer party worker in the much quieter period between election campaigns. He did some grass roots organizing and learned what kinds of things citizens complain to local politicians about.

Bruce's understanding of the way local politics actually works continued to stand him in good stead when he left the newspaper to work on his State's model cities program. From there, he moved to a job with a political consulting firm in Washington, D.C., where he planned the advertising for Senator Boyne's reelection campaign. After the Senator's victory at the polls, the next step for Bruce was the top job on Senator Boyne's staff.

Last night, Senator Boyne had told Bruce to come in early this morning and meet him in the Senate Caucus Room. It is 7:20 a.m. as Bruce enters the Senate Office Building. The place is alive with journalists and camera crews because several Senate committees are about to meet early to discuss parts of the Federal budget. As Bruce walks down a corridor, he is collared by a reporter, Barbara Weld.

"Bruce, how does the Senator feel about the changes that are due to be introduced today in the education bill? As you know, the leading teachers' groups are split. What position is Boyne going to take?"

"The Senator is all for the changes," replies Bruce without breaking stride. "Two weeks ago," he continues, "the Senator made a major speech on the education bill back home. He's a strong supporter of the changes that will be brought up on the floor today. Sorry, but I'm in a hurry. See you later."

Bruce continues on his way to the Senate Caucus Room, where a political strategy meeting of all the Senators from Boyne's party is about to begin. Entering the room, Bruce immediately spots a familiar, craggy face. It's Senator Boyne, deep in conversation with the junior Senator from North Carolina.

"Good morning, Bruce," says Senator Boyne, moving aside for a private conversation with his aide. "The meeting is about to begin," the Senator continues. "I've spoken with a few of my colleagues about the Middle East situation. It looks like we are going to support the administration's proposal in that area. We'll also be discussing the vacancy on the Supreme Court. We are backing Ambassador John Farmer for the appointment. Have my press secretary write a news release about the Middle East proposal and arrange a news conference for noon tomorrow. But don't answer any questions. We can review the statement tonight."

"Yes, sir, I'll take care of everything right away," says Bruce. Then he races back to his office to work out a news release with a press aide. He calls several prominent reporters about the news conference and tells his secretary to notify the Senate Press Gallery.

The office is bustling, as always. There are other Capitol Hill staffers who want copies of Boyne's statement on the SALT (Strategic Arms Limitation Treaty) talks, several lobbyists who want to express their clients' point of view to the Senator, and a few tourists.

Several of the Senator's staff aides are busy replying to the hundreds of letters that pour into the office every week. Recently, there have been a number of letters asking what Senator Boyne's position is on national health insurance. The administration's farm bill has generated an outpouring of letters from the Senator's constituents, most of whom oppose it. The Senator's constituents write every day to express strongly held feelings on inflation, housing, transportation, tax relief, governmental waste and corruption—virtually every subject under the sun. Senator Boyne sees to it that every letter is answered.

Bruce usually holds a staff meeting every morning between 9 and 10 to go over proposed speeches, pending legislation, and staff problems. Today, Bruce's meeting

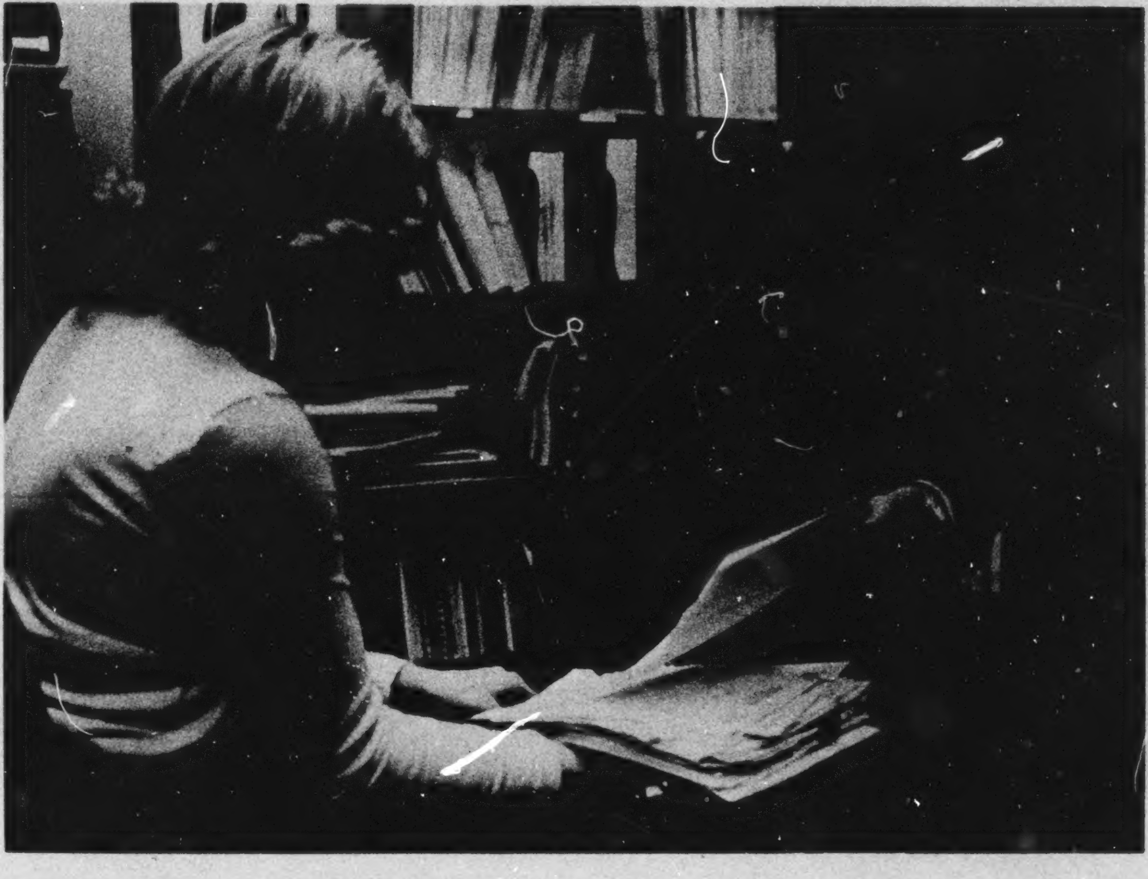
Bruce confers with a colleague regarding a news release.

with the staff will take place a little later than usual because of the news release. While the Senator is at committee meetings or on the floor of the Senate, it is Bruce who oversees everything that goes on in the office. Senator Boyne's staff consists of 25 people—legislative aides who do research on proposed legislation and answer letters; press aides who write speeches, floor statements, and press releases; a receptionist; secretaries and typists; and clerks who operate the computerized filing system. Senator Boyne also has a staff of eight in his home State.

As soon as the news release is taken care of, Bruce calls the staff together and announces, "Senator Boyne is going to Panama next month with some other members of the Foreign Relations Committee. I am getting a fact sheet together for you that will have the details. I'll include a few standard paragraphs that you can use in answering correspondence."

After several minutes of discussion of the Panamanian trip, Bruce says, "We'll have to cut the meeting short because the office is so busy today. Thank you."

As head of the office, Bruce sets the working hours for all staff members. His own hours depend upon circumstances and generally are longer when the Senator has a bill pending before the Senate or one of its committees. Bruce sometimes works at home. And his job involves travel to the Senator's home State. Several months ago, for example, Bruce was informed by the Army that it planned to sell some surplus land in the Senator's home State. After consulting with the Senator, Bruce arranged meetings with the Governor and with community and business groups to discuss ways of attracting purchasers who would use the land in a way that matched State residents' own interests and needs. Bruce outlined the results of the meeting to Senator Boyne when he returned to Washington.



Bruce reviews all outgoing letters before presenting them to his boss, Senator Boyne, for approval.

"Senator, Governor Johnson was pleased to learn about the sale of Army land, but she was angry because the military had failed to advise her in advance. We discussed ways of ensuring that most of the land is reserved for community purposes such as low-income housing and park and recreation areas. Several developers have expressed an interest in building a shopping center, a proposal that's meeting a favorable response. All in all, everyone is enthusiastic, and I've arranged some follow-up meetings later in the year."

"Great work, Bruce. Keep me informed. I may want to attend one of those meetings."

"Fine, Senator, I can arrange a dinner and invite some of your top campaign contributors, local business and community leaders, and government officials. You and the Governor might both want to address the group."

Bruce gets together with Senator Boyne every evening. Often, they have dinner together and discuss the day's events. At this evening's dinner session, Bruce hands the Senator the news release on the Middle East proposal that will be distributed at tomorrow's press conference. There also are a few letters that require the Senator's approval; he makes a few changes and returns them to Bruce.

It is close to 9 o'clock when Senator Boyne and Bruce are ready to go home. Bruce stops to buy the evening newspaper and arrives home just before 10. Bruce's job is interesting and challenging, but it is very demanding as well. He flops down on the sofa and wonders, not for the first time, what he's doing with his life.

"The job pays well and I make many important contacts. But I'm tied hand and foot to the job. I don't have enough time for myself. All those dates I had to cancel and the skiing trips I could never go on .... But if I were married, it might be even more difficult to hold down this job."

Exploring Careers

Bruce's thoughts stray to the future. "I wonder what I'll do next. After all, Senator Boyne won't be in office forever! I'll probably return to the political consulting firm for a while, but I'd really like to run for office some day. I have some great experience for that."

Bruce is too tired to continue with that train of thought. Tomorrow is another day, and so to bed.

Exploring

Political aides must understand our system of government, especially the legislative process.

- Do you enjoy social studies and civics courses?
- Do you do outside reading about politics and government?
- Do you read the editorial section of the newspaper?
- Do you like to discuss current events?
- Have you ever taken part in campaigns for school or local elections?
- Do you understand how the President is elected? Do you understand how laws are made?

Political aides must have leadership and organizational abilities to coordinate the work of the politician's staff.

- Are you a good leader? Do other people go along with your ideas when you're in charge of a group? Do they follow your suggestions?
- Do you enjoy organizing trips, parties, sports events, picnics, or dances?
- Have you ever organized a fund-raising event or a recycling campaign?
- Do you enjoy working with other people on class projects?
- Do you like working with others on school clubs or committees?

Political aides work long, irregular hours and must be able to handle problems on a moment's notice. They must adapt their personal lives to the needs of the job.

- Can you work under pressure?
- Can you do a good job when you're given something to do at the last minute?
- Do you perform well on pop quizzes?
- Are you a member of the school debate team?
- Are you able to stick to schedules? Do you usually get your school assignments in on time?
- Can you sacrifice leisure activities such as a movie or a baseball game when you have school work to do?

Political aides must be good at getting along with people of widely different backgrounds and points of view.

- Do you get along well with classmates and others you may meet?
- Do you make friends easily?
- Can you put other people at ease?

Political aides must be effective communicators. They need writing and public relations skills to present an appropriate image of the politician in speeches, letters, and press releases.

- Are you good at writing compositions and term papers for school?
- Are you good at doing essay questions on tests?
- Do you enjoy writing letters to your friends?
- Have you ever written a letter to the editor of your school or local newspaper?
- Are you good at getting your point across when you speak or write?

Suggested Activities

Watch our government in action. Visit the Congress or your State legislature. Attend a legislative session in your county or municipality.

Study the issues and attend public meetings of local government bodies such as the council of governments, city or county council, or board of education. Ask questions. Discuss the proceedings with your family and friends.

Invite an elected official or a member of his or her staff to speak to your class. Ask the speaker to discuss his or her job, background, and plans for the future. What does the speaker like and dislike about a career in politics?

Take an active interest in student government. Run for office. Manage the campaign of one of your classmates. Write an article on the campaign for your school or local newspaper.

Volunteer in a local political campaign. You might stuff envelopes, deliver campaign literature, put up posters, answer the telephone, or go from door to door urging people to vote for your candidate.

Some communities have a Youth Council whose function is to speak on behalf of young people and promote youth activities. Call the mayor's office to find out whether there is such a group in your community.

Follow the campaign of a candidate for political office. Clip newspaper and magazine articles and save brochures and flyers. Prepare a notebook or bulletin board that shows the ups and downs of the campaign and the final outcome.

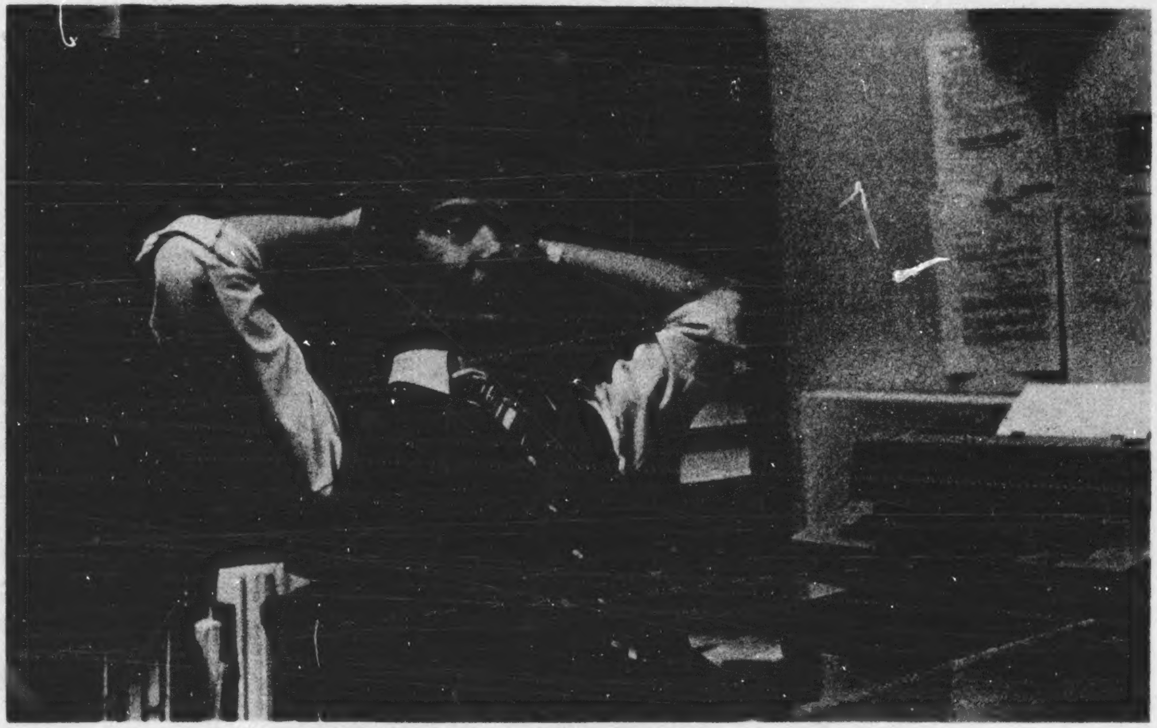
Plan and conduct a survey on an important issue in your school. You might survey both teachers and students so that there will be two groups to compare. Developing the questionnaire, distributing it, and tabulating and analyzing the responses will introduce you to the survey method of doing social science research.

Use voting procedures as a topic for a report in your social studies or English class. Learn the qualifications for voting. Find out the dates for registration and for voting in the primaries and the general election. Where are the polling places in your community? What do pollwatchers do? Who counts the ballots? Your local board of elections, or a civic group such as Common Cause or the League of Women Voters, can help you with your research.

As a project for a social studies class, prepare a chart of the organization of your village, town, city, or county government.

Develop communications skills by writing for your school newspaper, joining the debate team or speech club, or writing poetry and short stories.

Join a Government and Politics, Journalism, or Youth Leadership Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."



"I wonder at times what I'll do when I leave this job," says Bruce. "Perhaps someday I'll run for office."

If you are a Boy Scout, earn a merit badge in Citizenship in the Community, Nation, and World.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops may also offer opportunities to test career interests through internships, service aide and community action projects, and proficiency badges in a number of areas including My Country, My Government, and Reporter.

Write for information on careers in political science to the American Political Science Association, 1527 New Hampshire Avenue, N.W., Washington, D.C. 20036.

Related Occupations

People in many different jobs are involved in the American political process. Some work for government agencies; others are employed by private organizations; still others work directly for politicians or political parties. Political science provides an excellent background for these jobs. For some, however, research ability, creativity, and communications skills are most important. Some of these jobs are described below.

Barbara works for a member of the State legislature as a *legislative assistant.* She proposes ideas for legislation and attends meetings of committees that specialize in subjects to which she is assigned. She prepares comments that her boss uses in speeches to other legislators and to constituent, business, and other groups.

Dan works for a governor as a *press secretary.* He reviews newspaper and magazine articles about the governor and prepares news releases on the governor's position on various issues. He responds to inquiries from the news media and to letters from the governor's constituents.

Joanne works for a member of Congress as a *field representative.* She deals with questions and concerns of constituents. She serves as a public relations representative in the Congressmember's home district.

Bob is the *campaign manager* for his Senator, who is running for reelection. He runs the day-to-day operation of the Senator's campaign. He supervises volunteer and paid campaign workers, makes speeches, plans the Senator's campaign schedule, and performs many other functions.

Sue is a *fund raiser* for a neighbor who is running for City Council. She plans the campaign budget and helps get volunteers to work on the campaign. Mostly, though, she raises money to pay for campaign expenses by asking for contributions from individuals and businesses and by planning benefits such as carnivals and theater parties.

Barry works for a private firm as a *political consultant.* His goal is to create a favorable public image for candidates for political office. He plans radio, television, and newspaper advertising. He also keeps candidates informed of trends in voters' opinions on rival candidates and important campaign issues.

Mary works as a *pollster* for a private research firm. She conducts public opinion polls on candidates for political office and on a wide range of timely issues. The general public, and candidates in particular, study the results of these polls very closely.

Bruce is an *election assistant* for his county's board of elections. He sees to it that laws governing registration, filing, voting, reporting, and other election procedures are followed. He often trains election workers.

Carol is a *lobbyist* for an industrial firm. She tries to persuade legislators and other public officials to support legislation favorable to her firm's interests.

Ellen is a *legislative liaison officer* for a government agency. She studies legislation in her agency's field of interest and helps shape new legislation. She serves as a link between legislators and her agency, and often confers with officials in other agencies.

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Social Scientists

Job Facts

There isn't room in this book for a story about every social science occupation. However, you'll find some important facts about seven of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Anthropologists	Anthropologists study the human race. They examine people's traditions, beliefs, customs, languages, religions, art, law, and social systems. Most teach and do research in colleges and universities. Some work for museums, National Parks, foundations, and in private industry. Others are consultants for development organizations both here and abroad.	Anthropologists usually need a Ph. D. degree in anthropology. This requires 7 or 8 years of study, or more, beyond high school. High school students interested in becoming anthropologists should take courses in the social and physical sciences as well as mathematics.	Anthropologists generally specialize. That is, they do most of their work in one branch of anthropology—cultural anthropology (also called ethnology), archeology, linguistics, or physical anthropology. Traveling to remote areas, working in an uncomfortable climate, and living in primitive housing are sometimes necessary to do field work.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Economists	Economists study the way our society uses natural resources, labor, and capital to produce goods and services. They compile and analyze data that help them understand the costs and benefits of making, distributing, and using things the way we do. Most economists work in research organizations and private industry, including manufacturing firms, banks, insurance companies, securities and investment companies, and management consulting firms. Others work in colleges and universities and for government agencies. Some run their own consulting firms. Many economists work in the New York City and Washington, D.C. areas.	A bachelor's degree in economics, requiring 4 years of college, is sufficient for many beginning positions. However, a master's degree or Ph. D. is important for advancement. Economists who teach at colleges and universities usually need a Ph. D., which takes 7 or 8 years of study after high school. Since economists spend much time analyzing data, the ability to work with numbers is important. Familiarity with the computer as a research tool also is important in this field. High school students interested in becoming economists should take courses in social studies and mathematics.	Economists generally specialize. They do most of their work in one field, such as money and banking, economic theory, economic history, or in business, labor, agricultural, industrial, health, regional, urban, or international economics.
Geographers	Geographers study the physical characteristics of the earth in order to understand why people live where they do. Their research helps explain how the environment affects our health, our way of earning a living, and the kind of society we develop. Some geographers collect data for maps. Most geographers teach and do research in colleges and universities. A number work for the Federal Government, primarily for mapping and intelligence agencies. Those in private industry work for textbook and map publishers, travel agencies, manufacturing firms, real estate development corporations, insurance companies, communications and transportation firms, or chain stores. Others work for scientific foundations and research organizations or run their own research or consulting businesses.	A bachelor's degree in geography, usually requiring 4 years of college, is the minimum requirement for beginning positions. However, a master's degree or Ph. D. is required for advancement. Geographers who teach in colleges and universities generally need a Ph. D., which takes 7 or 8 years of study after high school. High school students interested in becoming geographers should take courses in the social and physical sciences and mathematics.	Some geographers do field work in regions of the world where living conditions and social customs are quite different from ours. Geographers often specialize. They do most of their work in a particular field such as cartography (mapmaking) or economic, urban, political, regional, physical, or medical geography.

Social Scientists

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Historians	Historians study the past. They examine things that happened in the past, the ideas people had, and the ways in which they lived and earned a living. Historians study these things to help us understand the present and predict the future. Most historians teach and do research in colleges and universities. Others work in archives, libraries, museums, research organizations, historical societies, publishing firms, and large corporations.	Historians usually need a Ph. D. degree in history or a related field. This takes 7 or 8 years of study, or more, beyond high school. High school students interested in becoming historians should take social studies and English courses to develop research and writing skills. Mathematics also is important.	Historians usually specialize. Some do all their research on the history of a particular country, region, or era. The American Civil War is an example of such a specialization. Others specialize in the history of a field such as religion, art, architecture, philosophy, science, medicine, women, black peoples, or military affairs. Others specialties are historic preservation and archival management.
Political Scientists	Political scientists study government. They examine the ways in which political power takes shape and is used, how government operates, and how it affects us. Most political scientists teach and do research in colleges and universities. The rest work in government, management consulting firms, political organizations, research organizations, civic and taxpayers' associations, and business firms.	Political scientists generally need a Ph. D. This takes 7 or 8 years, or more, beyond high school. Familiarity with quantitative research methods, including mathematics, statistics, and research uses of computers, is important in political science. High school students interested in becoming political scientists should take courses in social studies, English, and mathematics.	Political scientists usually specialize. They do most of their work in a particular field such as political theory, political behavior, public policy, State and local government, international relations, or comparative political systems—government in other countries.
Sociologists	Sociologists study people in groups. They learn about human society and social behavior by studying families, tribes, gangs, communities, and governments. Sociologists apply their knowledge in family counseling, public opinion analysis, law, education, regional planning, and many other areas. Most sociologists teach and do research in colleges and universities. A number work for government agencies in such fields as poverty, welfare, health, rehabilitation, population studies, community development, and environmental impact. Some work for private industry, research firms, or consulting firms. Others have their own consulting firms.	A Ph. D. in sociology often is required. This takes 7 or 8 years, or more, beyond high school. Because sociologists, like other social scientists, apply statistical and computer techniques in their research, an ability to work with numbers and solid grounding in mathematics are important. High school students interested in becoming sociologists should take courses in social studies and mathematics.	Among the many specialties are social organization, social pathology, rural or urban sociology, industrial sociology, medical sociology, criminology, and demography—the study of the size and characteristics of human populations, and how they change.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Psychologists	Psychologists study the behavior of individuals and groups in order to understand and explain their actions. Many psychologists work directly with people who are mentally or emotionally disturbed or deeply unhappy. They conduct interviews, administer tests, and counsel clients in order to help them deal with everyday life. Others teach, do research, plan and conduct training programs for employees, design surveys, and help industrial designers improve products by explaining the interaction between people and machines. Many psychologists work in colleges and universities as teachers, researchers, administrators, or counselors. Others work in hospitals, clinics, rehabilitation centers, other health facilities, and government agencies. Some work in correctional institutions, research organizations, and business firms, while others are in independent practice or work as consultants.	A doctoral degree in psychology is usually required. This takes 7 to 8 years of study, or more, beyond high school. Psychologists in private practice must meet certification or licensing requirements. Although these vary by State, they generally include a doctorate in psychology, 2 years of professional experience, and an examination. Emotional stability, maturity, and the ability to deal effectively with people are important qualities in this field. Sensitivity, patience, and a genuine interest in others are particularly important for work in clinical and counseling psychology. High school students interested in becoming psychologists should take courses in the social, biological, and physical sciences as well as mathematics.	Evening work is common, particularly for clinical and counseling psychologists, since patients often are unable to leave their jobs or school during the day. Among the many specialties in this field are clinical, counseling, industrial and organizational, experimental, developmental, social, and comparative psychology.

Answers to Related Occupations

MUSEUM CURATOR

1. Biographer, 2. Archivist, 3. Museum technician, 4. Restorer, lace and textiles, 5. Conservation technician, 6. Genealogist, 7. Archeologist, 8. Art conservator, 9. Armorer technician, 10. Paintings restorer, 11. Supervisor, historic sites, 12. Fine arts packer.

Social Service Occupations

In colleges and universities, counselors help students prepare for the job hunt after graduation.

Brrringgg! Brrringgg! Brrringgg! The phone rang persistently.

"Hello. This is Teen Hotline. My name is Gary. Can I help you?"

"I don't know," replied the caller defiantly.

"Tell me what's on your mind. I'm here to listen," responded Gary in a pleasant, easygoing voice.

"My parents are impossible—I can't stand living with them any longer. I'm going to run away!"

"You're going to run away?" repeated Gary. His matter-of-fact tone let the caller know he was with him.

The caller continued. "I just don't know what to do anymore. I'm being treated like a child and I'm not going to take it any more!"

"When did all this start?" Gary's manner encouraged the caller to open up. He seemed interested in hearing the details.

"Oh, I don't know. They're down on me all the time. Always picking on me to mow the lawn, to do my homework, to get home early. Nag, nag, nag. And nothing I do is ever good enough for them! They criticize my grades, tell me my friends are no good, bug me about playing my stereo too loud. They keep saying I'll never make anything of myself ... I don't know what they want."

The caller paused for a breath. Then he burst out, "I'm just sick and tired of being treated like a little kid!"

"Sounds like your parents have a lot of rules."

"I'll say," exploded the caller. "Rules, rules, rules, that's all my parents ever think of. And do you know the worst rule of all? I can't use the car!"

"Sounds like you're pretty upset about that. How did that come about?"

"Oh, well, there was an accident. Last year. I sideswiped a truck when I was driving my mom's car."

"Bad news."

"Right. My mom was pretty mad about it. It was a new car, you know? She had to get a new door and a new fender, and then she didn't like the paint job."

"You say your mom was pretty mad?"

"You're not kidding! Both my parents yelled and carried on about it. They kept after me and after me about it. Really made me feel bad."

"What I hear you saying is that you felt badly enough about the accident as it was ..."

"Yes, that's right, I felt terrible, that's what my parents don't understand," said the caller excitedly. "To hear them tell it, you'd think I didn't care at all about those accidents."

"Accidents?"

"Well, yes, as a matter of fact something else happened. I have crummy luck."

"Tell me about it."

"About a month after I banged up my mom's car, I was driving my dad's car. That one wasn't a new car, you understand, just an old tin can he used to drive to work. Anyway, I swerved, lost control of the car, and totalled it. The police said I was going too fast."

"Too fast?"

"I guess so, I really was moving along. No one was hurt. The car was smashed up, though. To hear my dad tell it, I'm the rottenest kid in the neighborhood. Totally irresponsible."

"And that's when they took your driving privileges away?"

"Right. That's when they lowered the boom on me."

"How did you feel about that?"

"Well, at first I felt so bad about the cars that I felt I deserved it. But those accidents took place 10 months ago! I feel I've paid for my mistakes. It's time for my parents to let up a little. I want them to let me have the car this summer. But they won't hear of it."

"Are they planning to let you drive again when the year is up?"

"Yes. Or so they say. But that's 2 months from now!"

"You don't believe them?"

"Oh, yes, I believe them. But I need the car now. It's summertime. Two months from now I'll be in school again and I won't need the car as much." The caller grew more agitated. "Tonight we had a big blow-up over it. I told them I was going to leave! What do you think I should do?"

"I take it you're not sure whether you want to leave or not?"

"Well—it could be the only way out of this. As I said before—I can't stand being treated like a little kid. Besides, some of my friends think I should leave."

"How is it that you've gone along with this for 10 months without running away?"

"Well, it's not as though I haven't thought about it!"

"What are some of the things that make you hesitate?"

"I guess I feel it will mess things up between me and my parents even more than they are right now. What do you think?"

"Well, I'm wondering what else makes you uneasy about trying it ..."

"I guess I think it would be a chicken way out. To run away from something instead of seeing it through," said the caller, interrupting Gary.

"Is that important to you ... to see things through?"

"Yes, I guess so. I can usually stick in there until the very end. I guess I'd better sit tight and wait another 2 months."

"Sounds like you've made a decision."

"Yes. Thanks for listening ...."

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Social Service Occupations

To do their jobs well, those in the helping professions must be genuinely interested in other people.

Gary's call was one of many that came into Teen Hotline that day. Gary is a college student majoring in psychology; he volunteers at the Hotline one afternoon a week. Himself just a few years older than the would-be runaway, he sensed that the youth just needed to talk through his family problems.

And that was what the hotline was for: Volunteers like Gary were trained to listen and help callers sort out their feelings. In this case, Gary had relieved the youngster's panic and had, by listening, given him the feeling that he counted. The youth seemed able to take it from there.

Family disputes like this one were behind many of the calls. So were dating problems. But calls on any subject were welcome, and youngsters called the hotline every day because they were lonely or depressed. They called with questions about sex, drugs, jobs, medical help, shelter for runaways, you name it.

Not all of Gary's calls go as smoothly as this one. Sometimes a caller gets angry and upset and hangs up abruptly. Sometimes Gary can tell that the situation is too serious for him to handle by himself. He suggests that the caller come in to talk with one of the counselors at the community center where Teen Hotline has its headquarters.

No matter what hour of the day it is, there usually are a few youngsters at Teen Hotline's drop-in center—just sitting around and talking things over among themselves. A trained counselor is on hand most of the time to talk out serious problems and direct youngsters to other sources of help in the community: Doctors, lawyers, psychologists, social workers.

The Helping Professions

The counselors and volunteer listeners at Teen Hotline are in the business of helping others. In fact, helping

Exploring Careers

This psychologist needed years of training to learn how to help people deal with their emotions.

people is such an important part of the job that social workers, counselors, and clergy are called members of the "helping professions." To do their jobs well, they have to be people-oriented. They must like people, be interested in all kinds of people, and have a genuine desire to help others.

Caring about people and wanting to help them is not enough, though. People in these occupations must be good at dealing with people and relating to them. They must have a manner that inspires trust and confidence. Nearly all of them have had training in how to deal with people and their problems.

Gary had been taught to handle phone calls like the one from the youngster who was having trouble with his parents. When he was first accepted as a peer counselor at Teen Hotline, Gary went through a course that taught him when to speak and when to listen. He had learned how to phrase probing questions. He had attended lectures, practiced role-plays with other volunteers, used audio tapes of crisis situations, and listened in on actual phone calls handled by experienced volunteers. Only then was he permitted to take his first call.

People who have professional jobs in this field need considerably more training than a hotline volunteer does. You probably know that doctors must study for years to learn enough to take care of people's bodies safely and wisely. Similarly, it takes years of training for a psychologist or a counselor to learn enough to help people deal with their feelings, emotions, fears, and worries. It also takes time to learn how to help people with their practical problems.

Supervision and backup are very important in this field, where people with different backgrounds and skills often work together as members of a team. Some have years of professional training; others are aides and volunteers like Gary. Their joint efforts help people who are troubled or unhappy. Gary knows that he can count on backup from the counselors and youth workers at Teen Hotline. That way, he handles telephone calls more confidently than he would if he were all on his own. He knows his limits, and has learned which calls to refer to other members of the staff. If a caller threatens suicide, for example, Gary knows what to do.

Now let's take a closer look at these occupations.

Social Service Occupations

Social Work Occupations

Social workers help people cope with crises that threaten to disrupt their lives. They help their clients understand what is happening to them and why, so that they can find their own solutions.

Social workers assist families that are being torn apart by poverty, alcoholism, drug abuse, behavior problems, or illness. They help children in many ways: They find families to adopt or provide foster care for children whose parents can't take care of them; they see to it that needy families are able to give their children proper food, health care, and schooling; they step in when there is evidence of parental neglect or abuse. *School social workers* help students who have such severe personal or family problems that they can't concentrate on learning. Social workers such as those at Teen Hotline give young people guidance and support so that they will learn to deal with their changing lives and develop into responsible adults. Some social workers do corrections work—they counsel juvenile delinquents and serve as *probation officers* or *parole officers*.

Sometimes, the problems that families and individuals face are so complicated that it takes people with several kinds of training to suggest a solution. This is one important reason why social workers have teamed up with members of other professions: Medicine, nursing, therapy, psychology, education, law, and religion, among them. A *medical social worker*, for example, may counsel a hospital patient who is feeling hopeless about his illness and advise the family as well—perhaps suggesting ways of caring for the patient at home that won't totally disrupt the family's normal routine.

Growing attention is being given within the social work profession to directing and influencing social change. Social workers whose specialty is social planning work with health, housing, transportation, and other planners to suggest ways of making our communities more wholesome places to live. Social workers use various forms of direct action to help people deal with some of the basic forces that shape their lives. They may, for example, do research to identify community needs; publicize their findings; draft legislation; or comment on government proposals in such areas as housing, health, and social and welfare services.

Counseling Occupations

Counselors help people understand themselves. They help them come to terms with their lives. And they give them the support and encouragement they need to make the most of their opportunities. Counselors usually specialize.

Family and child welfare is an important social work specialty.

Rehabilitation counselors help people with physical, mental, or social disabilities. They help them deal with the tremendous psychological adjustments they may have to make in order to cope with a handicap. They encourage their clients to learn new skills and to live as normally as possible. Some of their clients have been retarded or handicapped since birth. Others face the shock of blindness, or deafness, or an amputation when they are already grown. Such is the case, for example, with veterans who were badly injured or disfigured in the line of duty.

School counselors help elementary and secondary school students plan their courses and decide what they will do after they graduate. They spend a lot of time helping students with personal problems—behavior problems, family disputes, emotional upsets.

College career planning and placement counselors help college students choose a career and advise them on the kind of training or experience that will best help them find a job. They usually help students set up job interviews and give them ideas on how to prepare for these interviews.

Employment counselors help people of all ages plan careers and find jobs. Their advice helps people figure out what kind of work they're best suited for, and then prepare for it. They also give their clients tips on the best way of looking for a job.

Clergy

A career in the clergy is unlike any other. Members of the clergy counsel people of their faith and provide spiritual leadership within their communities. They enable people to worship according to the dictates of their consciences. As spiritual leaders, members of the clergy are widely regarded as models for moral and ethical conduct.

They frequently counsel people who have problems in their jobs, homes, schools, or social relationships; often, these are emotional problems. In fact, they deal in such delicate personal and emotional areas that the law provides that they need not disclose the nature of their communications with their congregants.

Members of the clergy help people in their communities in many other ways. They may set up programs that feed the poor, care for the sick, provide companionship for the lonely, and involve children and adults in educational and recreational activities.

Straight talk about adjusting to life "outside" can help a prisoner after he is released.

The three major religions in the United States are the Protestant, Roman Catholic, and Jewish faiths. But there are quite a few other religions in this country, too. How many can you name? In each of these, the clergy lead and counsel members of their congregation, conduct services, and represent their faith within the community.

Other Social Service Occupations

Other occupations involve helping people, too. *Cooperative extension service workers* work with people who live in rural areas. They teach and provide technical assistance in agriculture and home economics. Encouraging youth activities is another important part of the job.

Home economists provide training and technical assistance in areas that make everyday life more comfortable and livable—consumer economics, housing, home management, home furnishings and equipment, food and nutrition, clothing and textiles, and family development and relations.

Park, recreation, and leisure service workers plan, organize, and direct activities that help people enjoy themselves, learn something new, or find a way of getting closer to nature and the environment.

Personal Characteristics

People in social service occupations become closely involved with other people's lives and their advice can have far-reaching effects. A social worker's advice may lead an individual to change the course of his or her life. That's a big responsibility. For this reason, a genuine *concern for people* and a *desire to help them* are essential for anyone considering a career in this field.

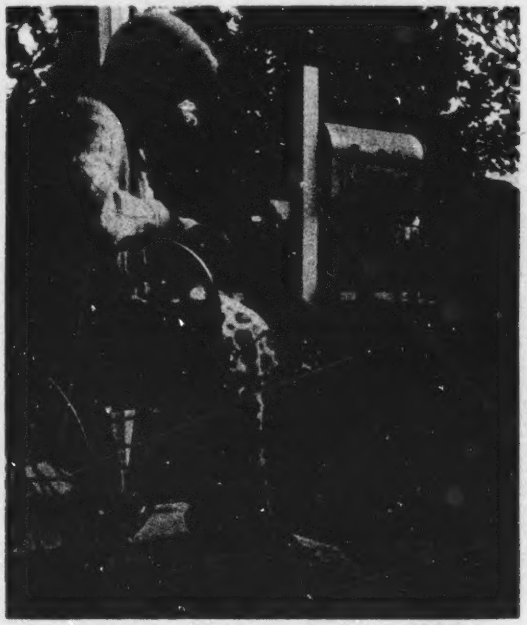
In order to make a difference in others' lives, however, you must be *good at dealing with people.* You need the sort of personality that puts other people at ease and encourages them to open up. The ability to achieve a warm relationship with others is important in all of these occupations. Your effectiveness will depend on your ability to listen, understand, explain, and persuade.

You should be *sensitive* and *tactful* and have a keen sense of what words or actions might offend others. Anyone who comes in contact with people's deepest feelings and beliefs—as members of the clergy and counselors often do–needs *empathy,* the ability to sense others' feelings. *Patience,* too, is required, for you may be dealing with people who are confused, hesitant, fearful, angry, and hard to talk to. Often, they aren't clear themselves about what the problem is—or how it should be dealt with.

Imagination and *resourcefulness* are necessary. People in these occupations may have to call on all their mental resources to find a solution. And sometimes just as much ingenuity is required to get a client to accept a suggestion.

Speaking and *writing skills* are important. In some of these jobs, workers have to keep a lot of notes and records. They must be able to present all the important points about a client's situation clearly and quickly. Verbal skills are also necessary. Counselors and social workers must be able to communicate on a one-to-one basis, and to work easily with groups. There also are occasions when they must speak before large audiences. Members of the clergy, of course, do this regularly.

Finally, workers in the social service occupations should know themselves—their own strengths, weaknesses, and goals. *Emotional stability* is important because people in this field are so often in touch with situations that are worrisome or depressing. There are "occupational hazards" in this work. There is danger of being overwhelmed by others' misery, the danger of expecting too much of yourself, the danger of "burning out" and losing the sensitivity that brought you to the field in the first place. The inner strength that comes with emotional stability will help you remain levelheaded and objective so that you can in fact *help* people—not just sympathize with them.



Some social workers specialize in serving the elderly.

Training

Training for a social service career ranges from just a few weeks for an aide to many years for a professional. If you were a hotline volunteer, for example, you'd be given a 1- or 2-week course right after you began work. Training for homemaker-home health aides is handled much the same way. Many other social service aides—those doing valuable work in reaching out to their neighbors and others in need—have little formal training. They don't even have to be high school graduates, for that matter. What counts in getting their jobs and doing them well is their understanding of their community . . . and their ability to deal with people.

For professional occupations such as social worker and counselor, however, 6 to 8 years of study after high

The staff at this center for the handicapped help clients believe in themselves.

School counselors give tests to get a clearer picture of students' interests and abilities.

Community organizers need to be good at speaking in public.

school are necessary. Rabbis, priests, and ministers usually have even more training than this. The training required for each of 13 social service occupations is described in the Job Facts at the end of the chapter.

To see whether this field really is for you, try doing volunteer work in your spare time. There are many things you can do as a volunteer; some of them are included in the Suggested Activities sections below. Bear in mind, however, that your duties as a volunteer are not likely to be the same as those of a social service professional, whose job requires years of formal training.

A Final Word

If the idea of working with people and helping them appeals to you, there are other chapters of this book that you might want to read.

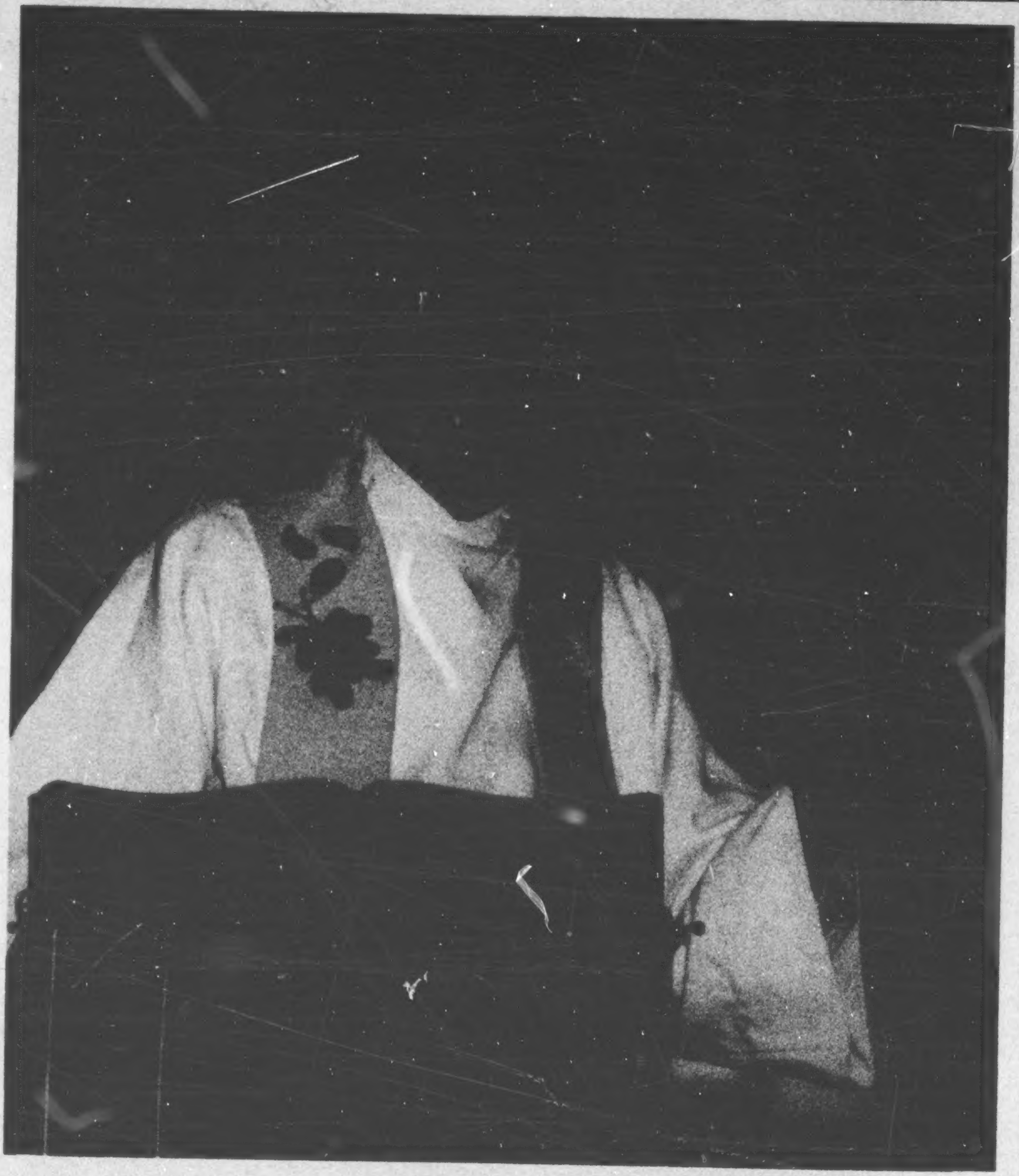
The education occupations also involve reaching out to people—advising, suggesting, persuading, motivating, and teaching. A story about a school counselor is one of several in the chapter on Education Occupations.

Cooperative extension service work is another way of helping people by teaching and advising them. The story of a county agent appears in the chapter on Agriculture, Forestry, and Fishery Occupations. These workers teach farmers about new methods of raising crops and livestock and help homeowners keep their lawns and gardens healthy. Their work is considered an "extension" of the State agricultural university's teaching and research.

Health workers and social service workers need some of the same personal traits. Physicians, nurses, and therapists who deal with sick or handicapped people on a one-to-one basis must be objective, resourceful—and compassionate. The ability to encourage and inspire people, so important in the rehabilitation counselor's job, is just as important for the physical therapist. The story of a physical therapist appears in the chapter on Health Occupations.

Planners, like social workers, often work with people in their neighborhoods and communities for the common good. That occupation is featured in the chapter on Office Occupations. Another occupation that involves a sensitivity to public concerns and an understanding of people's behavior in groups is political aide, described in the chapter on Social Scientists.

Protestant Minister



"I work hard preparing a sermon," emphasizes Reverend Spencer, "because it's my opportunity to reach many people at one time."

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The phone rang in the Reverend William Spencer's bedroom just before dawn one September morning. Mrs. Wilson, a member of his congregation, was sobbing uncontrollably at the other end of the line. "Reverend Spencer," she finally managed to say, "my husband died in his sleep last night and I don't know what to do."

The clergyman came awake immediately. He calmed Mrs. Wilson, then said, "I'll be at your house in 20 minutes." Dressing quickly, he rushed down the stairs and out the front door, started his car, and drove through the silent streets to the Wilsons' house. There he found his parishioner crying soundlessly. He spoke gently, preparing her to cope with the immediate situation. After a while, Rev. Spencer reported the death to the police and placed a call to a local funeral home. Then he phoned a neighbor and asked her to stay with Mrs. Wilson that day, until her son and daughter-in-law arrived from out of town. It was nearly 9 o'clock by the time Rev. Spencer left, confident that Mrs. Wilson had the help she'd need to get through the rest of this tragic day.

As he drove back toward his church, he thought about how helpless he sometimes felt in the face of a parishioner's grief. It still wasn't easy to find the right words, although he'd helped people deal with pain and sorrow many times during his years in the ministry.

He hadn't originally intended to enter the clergy. In college, he had been deeply concerned about social justice, the morality of war, and fundamental issues of right and wrong. He found himself translating his concern into social action—organizing programs to help the poor and taking part in demonstrations—and by his junior year Bill Spencer decided that he had a "calling." The ministry, he believed, offered him a meaningful way to spend his life.

After he graduated from college, he entered the seminary and spent the next 3 years studying there. In the seminary, he had learned a great deal about religion. He had learned about himself. And he had learned about working with people. During his first year as a seminarian, he served as chaplain in a local hospital. There he had learned to understand grief and to help people deal with the shock of sudden loss, just as he had helped Mrs. Wilson today. After he completed his training in the seminary, he was ordained as minister.

His first church was in a suburb of Columbus, Ohio. The bishop arranged for him to serve there for 1 year. After that, he was on his own. He remembered the day a classmate from the seminary had told him about the job opening here at St. Andrew's. He had applied along with 75 other ministers and was fortunate enough to be chosen for an interview. Finally, after several interviews, he was invited to serve this congregation. He remembered feeling a great sense of joy—and relief! The competition had been tough but somehow it seemed as though this church had been his destiny. He hoped so, anyway.

Rev. Spencer pulled into the church parking lot just in time for the 9:30 meeting with the vestry—members of the congregation who serve as a board of directors. Today they would be discussing a proposal to build a new wing for the church school.

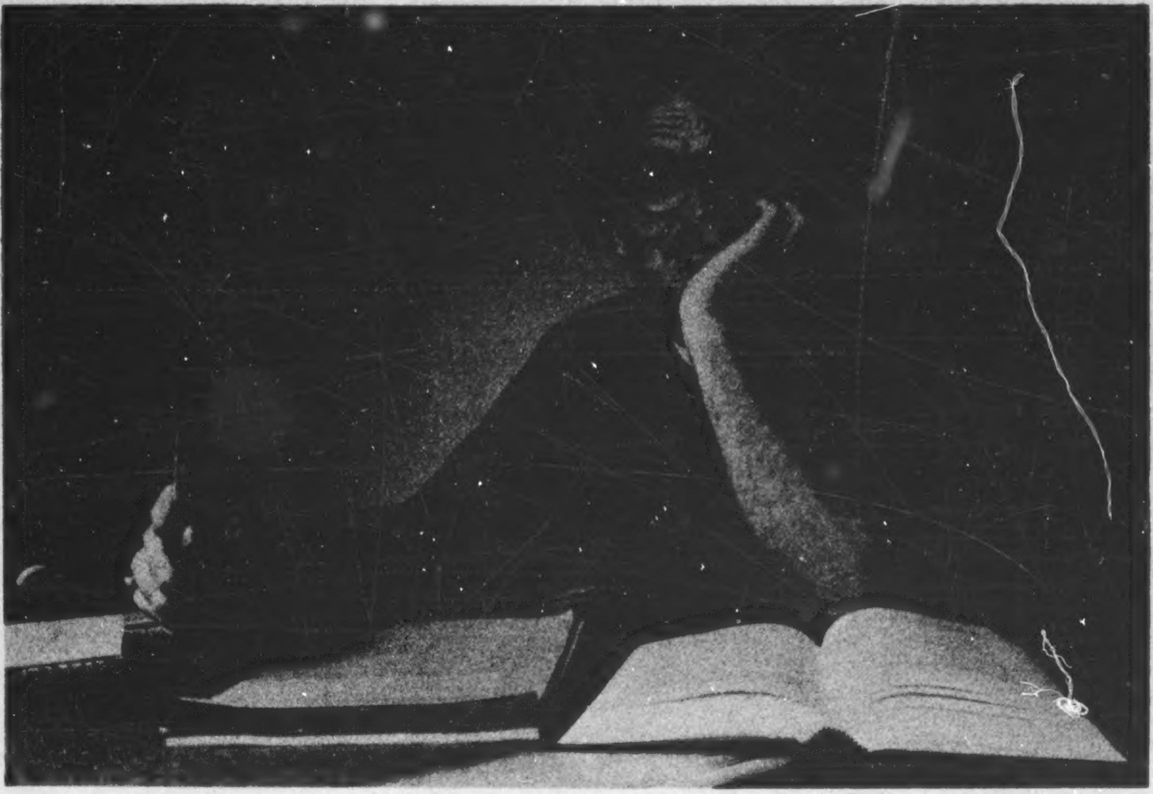
Jim Atwood began by saying, "I like the idea, but we just don't have the money for the new wing. Why don't we wait a couple of years and then perhaps we will be able to afford it." Several other board members agreed.

Then Rev. Spencer spoke up. "First," he said, "I have to point out that we desperately need the additional classroom space. As you all know, we're overcrowded now—mainly because our program is such a success. Take our activities for teens, as just one example. We have teenagers here several nights a week. They have a Bible study group; they run the youth hotline; and they come for folk dancing and other strictly social gatherings. There's just as much demand for meeting room space from our adult groups. Not to speak of the children who use the rooms in the daytime!"

"Second," Rev. Spencer continued, "I believe that we can raise the money for the building expansion if we try hard enough. Remember last year we felt we couldn't afford to hire an additional minister to help with our youth program, but we took on an assistant anyway? The church activities and projects she's planned have helped us reach many more young people than we did before. I think you'd agree that we're making a real difference in their lives. Our youth progam is so important to us that, as you know, we've managed to find a way to pay for it. I believe we can be just as successful in finding the money to expand our school.

"Let's not give up on the new wing," the minister concluded. "Let's explore ways of raising the funds we need."

After the meeting with the vestry, Rev. Spencer spent a few minutes with the church music director. They were doing lots of exciting things with music at the church these days. One of the services Sunday would feature folk music, and the guitarists would need rehearsal space at least one night this week. The organist and the church choir would be rehearsing on Tuesday, as usual; they were preparing some new hymns for the other two services on Sunday. Later in the year, the church musicians hoped to produce their own version of a medieval mystery play—a religious drama with music and dance. One of the parishioners was already working on the choreography. Opportunities like these for artistic and



Reverend Spencer's job involves a lot of time away from the pulpit.

intellectual creativity made Rev. Spencer feel he was lucky indeed in his life's work. He also was glad he had this particular congregation.

Just before lunch there was a brief meeting with other members of the church staff—the sexton, the church school director, and the assistant ministers. Together, they reviewed some of the many programs that the church sponsored in the community. At today's session, they concentrated on the Saturday field trips the church ran during the school year for children from all parts of the city. Very few Spanish-speaking children participated, although the city had a large Hispanic community. Various suggestions for reaching out to these children were discussed, but the meeting came to an end before anything was decided. "That's often the way," thought Rev. Spencer, who felt too much of his time was spent in meetings.

Rev. Spencer did not have any appointments scheduled for early afternoon, which meant he had a good stretch of time to work on his sermon for next Sunday. And, before the afternoon was over, he hoped to be able to spend some time visiting members of the congregation who were sick or lonely or in need of spiritual counsel. There were many people—too many—who needed comfort that day. A young woman who had attempted suicide was still in the hospital. A widower was having so much trouble adjusting to life without his wife that it was clear to Rev. Spencer that some special effort would have to be made to help him. And several families, he knew, had more than their share of pain right now. It bothered Rev. Spencer a great deal to realize that he wouldn't be able to visit all the people who needed consolation that day. The conflicting demands on his time weren't easy to resolve, and he prayed for guidance when he had to make difficult decisions such as these.

As he glanced at his appointment calender, Rev. Spencer saw that he was scheduled to see Bob Dudney and Gretchen Moser that evening to discuss their forthcoming marriage. Helping two young people get a good start in marriage was the sort of thing he most liked to do. It

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was a joyous task, one that lifted his spirits even at the end of a long day.

Bob and Gretchen were waiting nervously in the comfortable, book-lined study when Rev. Spencer walked in shortly after 8 o'clock. "Sorry to keep you waiting," he said. "Now let's get to the matter at hand. I'm amazed at how much it takes to keep a marriage together today. I was reading in the *Journal of Applied Psychology* that one theorist believes that the stress some marriages cause is equal to that experienced by a soldier in combat."

"Does that mean I'm liable to get shot?" asked Bob as he nervously shifted in his chair.

"No, no," replied the minister, chuckling. "But it does mean that many married people believe it is easier to go AWOL—absent without leave—than to stay in there and keep trying. What I think we need to discuss tonight is how to make marriage work. I don't have all the answers. But I have a good sense of the kinds of things that cause trouble in a marriage. What do you think the most common marital problems are, Gretchen?"

"Well, let's see. Money and not getting along with each other?"

"Two very common ones," Rev. Spencer assured her. "What are your guesses, Bob?"

"I guess I'd say sex problems and poor communication."

"Both of you are on the right track, but you left out a very common problem."

"Tell us what it is!" said Bob quickly.

"In-laws. Believe it or not, in-laws can be the source of a lot of marital difficulties. Almost without realizing it, and certainly without meaning it, your parents can cause tension in your marriage."

"I should have thought of that myself," groaned Gretchen. "Particularly with your mother, Bob!" she said, half teasingly.

"Is your mother a problem, Bob?" probed the minister.

"Oh, no real problem. She's just having a hard time accepting the fact that I'm actually getting married. I think she'd like to have me around the house for a few more years. But she'll get used to all of this in time!"

"Not without your help, Bob," Rev. Spencer said sternly.

"What do you mean by that?"

"It is important that you both begin presenting yourselves as a team to your families. Get in the habit of saying things like, "I'll have to discuss that with Gretchen," or "I'll have to ask Bob what he thinks about that." As the Bible says, "Leave thy mother and thy father and cleave unto thy wife." There is a world of truth in that verse. It doesn't mean that you stop loving your mother and father—it just means that you love one another more. Nothing should supersede the importance of the marital relationship. Am I getting through to you?"

"Yes, I think so," said Bob slowly. "Do you mean that before my mom can respect Gretchen as my wife, she'll have to see that I do?"

"That's exactly what I mean," said Rev. Spencer with a glow in his eyes. "You have a commitment to each other as life partners."

"Sounds like good advice," said Gretchen seriously. "How about discussing some of the other problems, Reverend? Or don't we have time tonight?"

"Let's save them for our next session, okay?" said the minister warmly.

Exploring

A member of the clergy must have a compelling sense that serving God and working for the betterment of humanity should be his or her life's work.

- Do you feel strongly about your faith and your religion?
- Are you active in your church?
- Are you interested in and concerned about problems in your community and in the world? Are you aware of such problems as poverty, hunger, poor housing, unemployment, injustice, and illiteracy in your own community?

The clergy must set an example of high moral and ethical conduct.

- Do questions and discussions about right and wrong interest you?
- Can you hold firmly to what you believe is right even when your friends don't agree?
- Do you treat others as you wish to be treated?
- Are you comfortable with the idea of people looking to you as an example?
- Would you mind having your life subject to public scrutiny?
- Are you conscious of your public responsibility when you are elected to the student council, chosen to be yearbook or newspaper editor, or asked to chair a church or school club?

The clergy must be approachable and warm since personal counseling is one of their prime responsibilities.

- Can you make a friend feel better about a problem such as failing a test or being turned down for a date?

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- Do people come to you for advice?
- Are you able to keep a secret?
- Are your friends able to talk to you about "anything?"
- Are you able to put house guests at ease?
- Are you able to converse with people you don't know very well?

The clergy must have the ability to inspire others.

- Have you ever changed a friend's viewpoint?
- Can you argue your point persuasively?
- Do your friends ask your opinion on things?
- Are you able to get your way without seeming bossy?
- Do you understand the importance of praising a child when he or she behaves very well, does a lesson correctly, or masters a skill?
- Can you see that such praise "works" with grownups too?
- Can you help people to help themselves?

A member of the clergy must be able to command the attention of a group.

- Are you good at making class presentations?
- Is it easy for you to "get the floor" at committee meetings or parties?
- Do your friends ever ask you to be the spokesperson for a group? At a friend's going-away party? At a victory celebration? At a birthday party?

In order to help others, clergy must be able to regulate their own reactions to the crises in people's lives.

- Can you remain calm when a friend or relative faces a very serious problem?
- Can you remain calm when a parent is upset?
- Can you think and act quickly in a crisis situation?
- Does it upset you to visit people who are very sick?
- Can you comfort a friend or family member during a time of sorrow?
- Can you overcome your anger and keep from holding a grudge when someone hurts you?
- Can you maintain some sense of proportion about school rivalries?

The clergy must perform ceremonies and conform to traditional rituals.

- Do you enjoy initiation ceremonies?
- Do you understand the importance of such ceremonies as confirmation, marriage, or graduation?
- Do you understand the importance of school and community awards for scholarship, athletic ability, bravery, or public spiritedness?

The clergy must be creative in communicating their ideas.

- Are you good at writing compositions or short stories?
- Can you write an interesting letter to a friend?
- Do you like thinking of ways to interest children in their school work? In crafts or sports? In Bible stories?

Suggested Activities

Volunteer your services to your church or synagogue. As you find out how many opportunities there are to help, you will get a better idea of the varied activities in which members of the clergy are involved. Volunteers assist in music programs as instrumentalists, singers, composers, arrangers, and directors. They type, file, answer the telephone, stuff envelopes, and handle other clerical duties in the office. They put out the newsletter or weekly bulletin, write press releases, and handle publicity. They help with fundraising drives. Volunteers staff social action programs including hotlines, Meals on Wheels, and aid to disaster victims. Youth programs, religious education programs, day care centers, and vacation Bible schools also use volunteers.

Volunteer to work with children as a tutor or aide in an elementary school. Help out at a nursery school or Head Start program. Offer to help direct children in arts and crafts, music, or sports at a summer recreation program. This will help you develop leadership and teaching skills and test your ability to handle a group.

Volunteer to work in a program that will bring you into close contact with a wider variety of people than you normally meet at your school, church, or synagogue. This will broaden your knowledge of community needs and increase your understanding of human behavior.

Collect magazines, clothing, and funds for a missionary drive.

Take part in your church or synagogue visitation campaign to encourage people to attend religious services.

Run for youth deacon.

Set a goal for reading the Bible from cover to cover.

Compete in a local Bible drill.

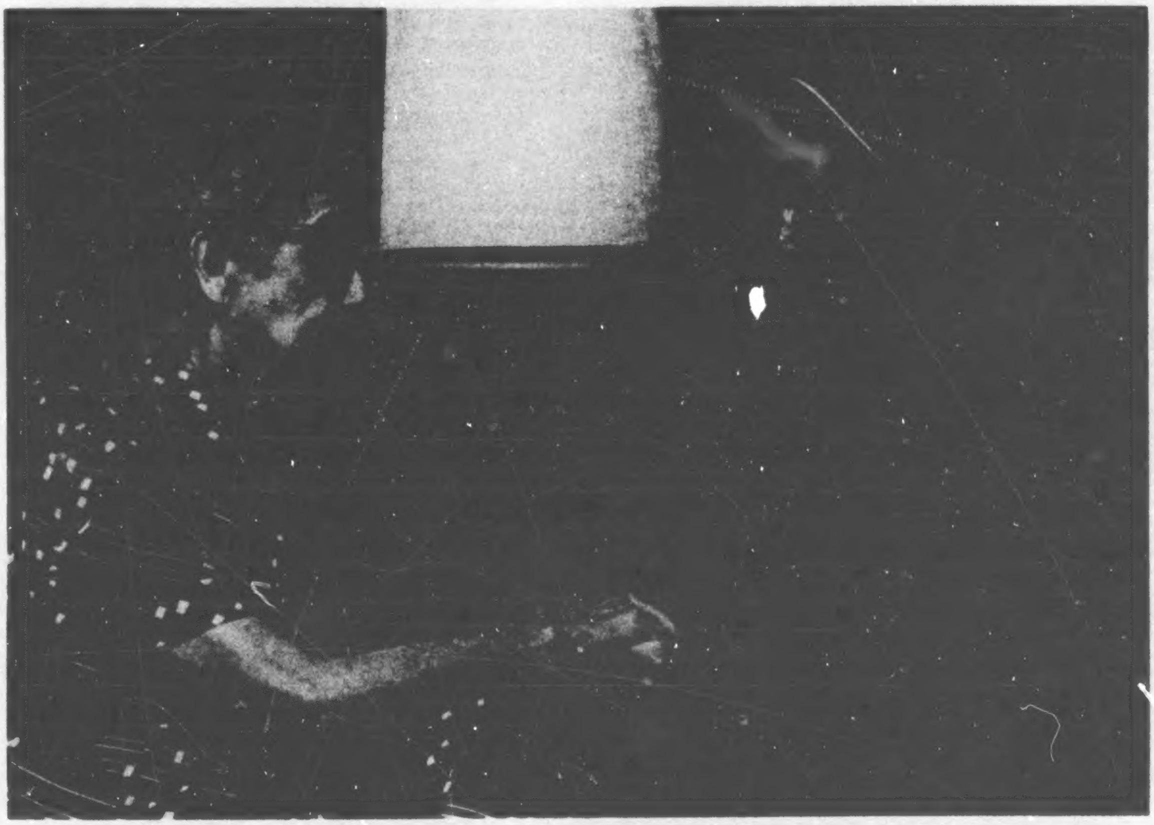
Try out for your school debate team. Public speaking is an essential part of the clergy's job.

Join or organize a prayer or study group. Test your organizational skills and your ability to work effectively within a group.

Put yourself in the helper role on a daily basis. This may involve listening to a friend talk through a problem, visiting elderly people in the community who are confined to home, or becoming a big brother or big sister to a disadvantaged or handicapped child.

Read books and magazines on religious occupations. Talk with your priest, minister, or rabbi about what it's like to have a religious occupation. Test your interest.

For more information about careers in this field, write to the Interdenominational National Council of the Churches of Christ, Unit of Professional Church Leadership, 475 Riverside Drive, New York, New York 10027; the Catholic National Center for Church Vocations, 305 Michigan Avenue, Detroit, Michigan 48226; or the B'nai B'rith Career and Counseling Service, 1640 Rhode Island Avenue, N.W., Washington, D.C. 20036.



People in the helping professions need empathy—the ability to sense others' feelings.

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Social Service Occupations

Related Occupations

Helping people with their personal problems is an important part of a Protestant minister's job. The desire to help others is just as important for members of the clergy in other religious faiths. Workers in other "helping" occupations spend much of their time advising and counseling people, too.

Eight occupations are listed below. See if you can match each job title with the correct description.

Psychologist
Chaplain
Missionary
School counselor
Christian Science practitioner
Rabbi
Social worker
Priest

1. I am the spiritual head of a Jewish congregation. I teach and interpret Jewish law and tradition.

2. I give religious counsel and leadership in the Armed Forces, police departments, prisons, colleges and universities, hospitals, and other places.

3. I help individuals and groups cope with problems that, at times, are overwhelming: Poverty, illness, unemployment, family disputes, antisocial behavior, and inadequate housing.

4. I am the spiritual head of a Catholic congregation.

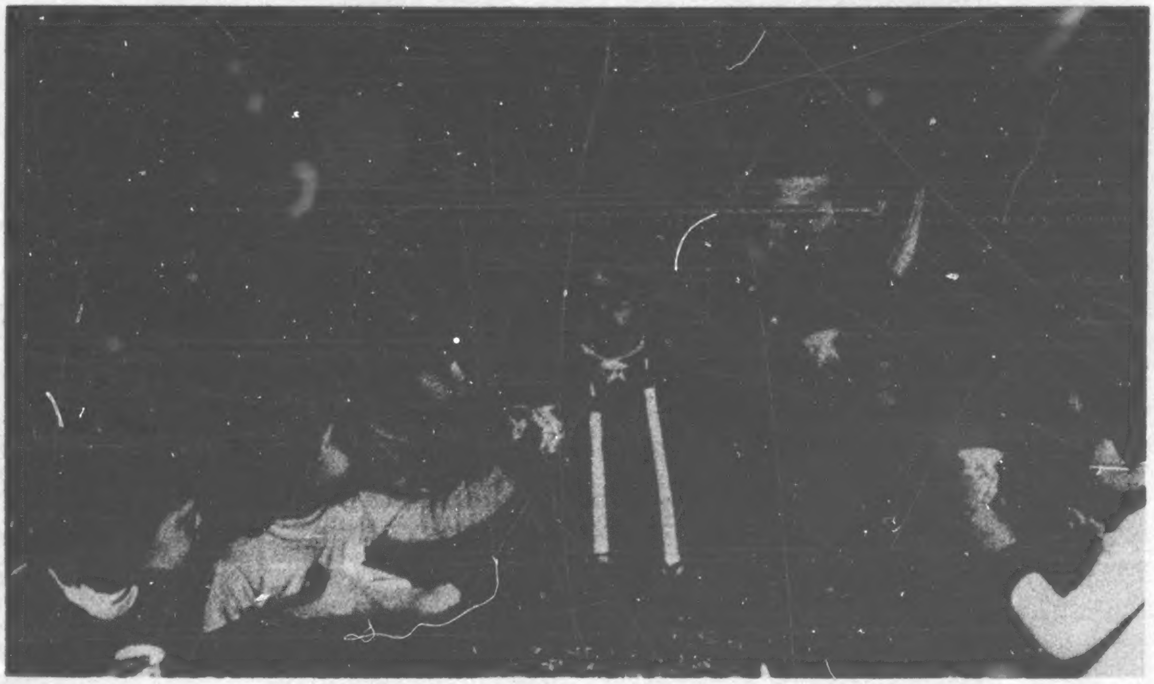
5. I carry a religious message to people who are not of my faith.

6. I help students select courses, explore career possibilities, and decide what to do after they graduate. I collect and analyze information that tells me something about students' interests, aptitudes, abilities, and personality characteristics. Most of this information comes from records, tests, and interviews. I collect occupational and educational information, and encourage students to browse through it.

7. I practice spiritual healing through prayer alone in accordance with the teaching of my religion.

8. I study people and try to understand why individuals and groups behave as they do. My research is put to use in many fields: Mental health, juvenile delinquency, drug abuse, crowd control, early childhood education, and counseling of retirees, for example.

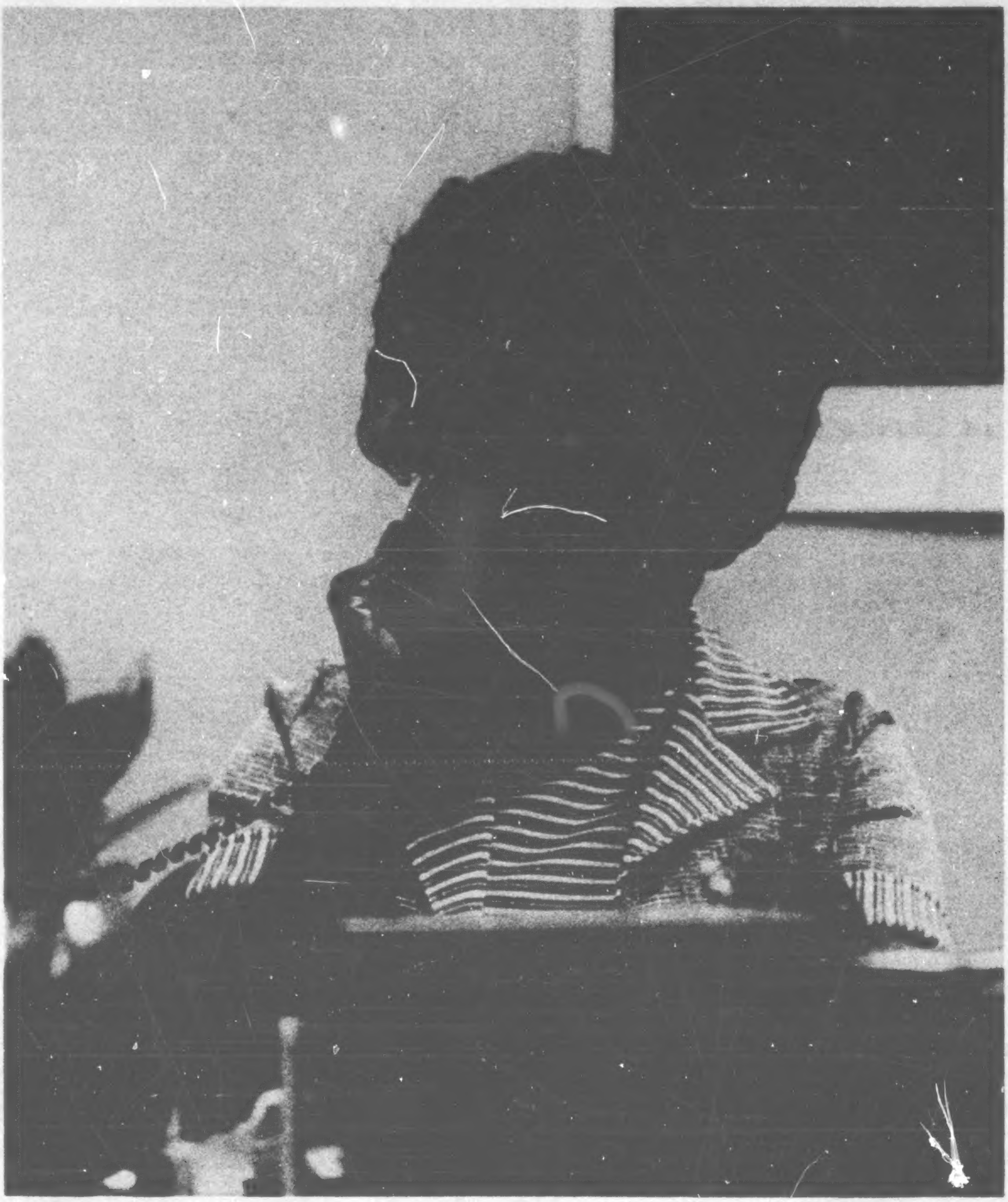
See answers at end of chapter.



Teaching children the rituals of their faith is one of the many ways this rabbi serves his congregation.

Exploring Careers

Social Worker



Mary Rogers is a social worker at a senior center.

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Social Service Occupations

Mary Rogers is a social worker. Her office is in a senior center in one of the poorer sections of the city. Her job there is to find places to live for elderly people who have no home of their own. Some of Mary's clients are former mental patients. Having lived for years in institutions where other people made all the decisions, they do not find it easy to manage on their own. Some of them are too confused or afraid to talk to a landlord or landlady about renting a room. Others are illiterate. Since they can't read, they can't use the newspaper want ads to find a place to live. All of Mary's clients are poor.

The program she runs was Mary's idea in the first place. Basically, she does three things: She finds sponsors willing to take elderly people into their homes, interviews clients who need homes, and keeps up with any problems that might develop. So many problems *do* come up that Mary spends most of her time talking with people, listening, and sorting things out.

Mary never knows what to expect when she sits down to talk with one of her clients. She's found that some of these conversations enrich her life and brighten her day—much as her talks with her grandmother did when she was growing up.

Mary's grandmother was a good friend. The two of them found a lot to talk about, for they shared an enthusiasm for living. Mary never tired of listening to her grandmother's stories about the years she worked as a union organizer in a mill town. The girl had listened, spellbound to tales of the hardship and heartbreak endured by workers' families in those difficult days. The older woman's insights into human nature and compassion for people in trouble had made a strong impression on Mary.

She began considering ways in which she, too, could work with people and help them. That eventually had led to a master's degree in social work and the important decision to specialize in work with the elderly.

Mr. Adams is one of Mary's clients at the senior center. He's one of her most exasperating clients, for Mr. Adams has a drinking problem. His bouts with the bottle are causing sleepless nights for the Youngs, his home sponsors. Today, there was a note on Mary's desk from Mrs. Young. She wanted to talk with Mary right away; she couldn't stand to have Mr. Adams in her house one day longer.

"I can't take it any more," Mrs. Young greeted Mary as the social worker came up the front steps. "Last night he got so drunk that he sang until 4 o'clock in the morning! It's just too much for me to handle."

Mary managed to patch things up for the time being. There was a promise of one last try from Mrs. Young and a pledge to keep sober from Mr. Adams. She knew, however, that in just a few days she was likely to have another desperate message from Mrs. Young. She'd have to start planning ahead for Mr. Adams.

Mary returned to her office just as a busload of the center's members was returning from a trip to the zoo. She could hear the excitement in their voices as they came inside. "It's amazing how a change of scene can lift people's spirits," Mary thought.

Just then she caught sight of Mrs. Hodge in the hallway. Mrs. Hodge hadn't gone on the outing to the zoo, and Mary knew she'd welcome some special attention.

"Mrs. Hodge, let's go back to my office so we can talk."

Mrs. Hodge was a gentle, rather timid woman who had taken a bad fall the winter before and was still suffering from the pain in her hip. "I've just been to the doctor," she said with a sigh as she painfully lowered herself in the chair across from Mary.

"It hurts right now, doesn't it, Mrs. Hodge?" Mary inquired in a sympathetic tone.

"Oh yes, dear, it does hurt. I just wish the doctor would visit with me a little longer. I saw him this morning, you know. It's so hard for me to get to the clinic and then I have to wait at least an hour to see him and, well, I think he should extend me the courtesy of a little talk. Don't you, Mary?"

"Absolutely, Mrs. Hodge, that's entirely reasonable. We all need some time to discuss our problems, physical or otherwise."

"Well, anyway, he gave me another prescription for the pain. I have to get over to the drug store before it closes."

"Why don't I pick up the medicine and drop it by your house tonight on my way home from work?"

"Oh, would you, Mary? Thank you. That's so kind of you." The older woman's eyes filled with tears.

Emotional moments like these punctuated Mary's day. But, she reminded herself, they happened only if you really cared about people. That, she knew, was what social work was all about—caring for people enough to help them make their own decisions about their problems.

Right after lunch, a sandwich at her desk, Mary called a meeting of the social workers she supervised. Together, Mary and the others reviewed the caseload for the center's home placement program, concentrating on cases that were causing problems. One of the workers wanted ideas for dealing with a client who spent all of her money early in the month and then had nothing to live on until the next check came. After discussing a number of possibilities, Mary suggested that the social worker arrange for the client to get her money a little at a time throughout the month instead of receiving everything at once.

Exploring Careers

Mary spent the rest of the afternoon making final arrangements for tomorrow's forum on the needs of the city's elderly. The forum was sponsored by We Care, a coalition of local organizations including senior centers, churches, legal aid programs, and citizens' groups. Mary was one of the founders of the coalition. She and the others who had started the group just 3 years ago wanted to educate the public—and influence city officials—about the problems faced by elderly people in their city. They arranged for newspaper and television coverage, made speeches, testified before the city council, and sponsored public forums such as the one that would take place tomorrow.

We Care already had focused attention on proposed cutbacks in Medicaid payments and improper procedures in assigning apartments in the city's public housing project for the elderly. By now, local politicians took the coalition seriously. The mayor herself had agreed to attend tomorrow's forum.

As Mary walked through the double doors of the municipal auditorium the next day, she noticed that a busload of people from her senior center already had arrived. More elderly people were coming in every minute. They looked purposeful; many compared notes.

"I hope the mayor is prepared for this one," Mary thought. "The audience certainly is prepared for her."

After several minutes, the mayor arrived. She walked briskly to the podium, apologized for being late, and asked for questions. Soon they were coming thick and fast—questions on property taxes, housing, crime, transportation, red tape. Most of the questioners were older people—some retired, some still working, all concerned about the inconveniences and hardships they faced because of diminished incomes and diminishing strength. A tall, elegant, white-haired woman moved slowly through the hall to the speaker's podium. She lived in a nursing home, and the plastic identification band around her wrist clashed incongruously with her beautifully tailored suit. She spoke movingly of the need for transportation services for people who, like herself, were infirm. And for people who were handicapped.

As the mayor spelled out the details of a tax relief proposal she had just put before the city council, Mary's attention wandered. The meeting appeared to be a success. Elected officials were listening to citizens' concerns. She found herself thinking how important that was . . . and how much she liked being one of the people who made such a meeting possible.

Yes, she was pleased with her job. She enjoyed finding ways to help people take charge of their lives. And she knew that in helping older people now, she was helping the older person she would be herself one day.

Still, what *would* she do about Mr. Adams?

"By helping older people now," says Mary, "I am helping the older person that I will be."

Exploring

In order to give people the confidence to deal with their problems, social workers must value the dignity and worth of the individual.

- Do you believe that you can learn something from everyone?
- Do you feel badly when a classmate is embarrassed?
- Do you think it's important that all people enjoy equal rights?
- Do you want to be personally involved in working for social justice? Do you want to do something about poverty, hunger, or hatred?
- Are you open-minded about other people's right to think, feel, and act in ways that may seem strange, even wrong, to you?
- Do you think people who are unhappy or mixed up or in trouble can be helped?

Social Service Occupations

Mary finds that conversations with clients frequently enrich her life and brighten her day.

Social workers must show their concern for people through a manner that is sympathetic yet objective.

- Are you able to see both sides of an argument?
- When something goes wrong, what do you do first? Look for a solution or place the blame?
- Are you happy for your friends when they meet with good fortune?
- Do you feel a genuine concern for your friends' and relatives' welfare?
- Do you like *most* people?
- Are you aware and considerate of the feelings of others?

Social workers must build a basis for trust.

- Are you able to maintain friendships over long periods of time?
- Do your friends confide in you?
- Do people often ask your advice or opinion?
- Are you able to keep a secret?
- Do you make friends easily?
- Are you able to make your house guests feel welcome?
- Are you able to put people at ease?
- Can you work closely with others and be flexible enough to do things someone else's way?

Social workers must understand human behavior.

- Do you know your own strengths and weaknesses?
- Do you understand why you do the things you do?
- Do you understand why your parents do the things they do?
- Do you know when to speak and when to listen?
- Are you able to get your friends to do things your way without seeming bossy?
- Are you able to feel what kind of mood a friend is in just by observing his or her facial and body expression or tone of voice?
- Are you more apt to judge people by their good points than by their faults?

Social workers must be able to speak the client's language. They must be good at communicating effectively in different kinds of situations.

- Can you talk to all kinds of people?
- Are you able to carry on a conversation with a child?
- Are you able to express your feelings to most adults?
- Are you good at speaking in front of a group?
- Are you ever asked to be the spokesperson for a group?

Social workers must be able to express themselves clearly in the written record of their work.

- Are you good at organizing your thoughts for a school assignment or an essay question on an exam?
- Are you good at writing compositions?
- Do you enjoy writing to your friends?

Social workers don't always see the results of their work immediately. Often they must remain supportive and helpful during times of slow progress.

- Do you appreciate small gains or progress?

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Exploring Careers

"I can't tell people what's best for them, but I can try to help them make their own decisions."

- Do you have the patience to grow a garden?
- Do you have the patience to pursue projects such as needle work or modelbuilding?
- Are you able to stick with a diet or exercise program?
- Can you be patient with people whose pace is slower than yours?
- Can you persist in the face of setbacks?
- Can you cope with failure?
- Are you realistic in your expectations even though you may be idealistic in your goals?

Suggested Activities

Volunteer to work in a social service agency in your community. There are more agencies than you might think. Try, for example, the local department of public welfare, a family service agency, agencies run by Catholic, Protestant, and Jewish organizations, or the Salvation Army. Volunteers answer telephones, greet and direct visitors, provide clerical assistance, and sort donations. They may also visit the lonely and work with children.

Volunteer to work in a crisis counseling center. This is a good place to learn about the most critical problems in your area and to find out how community organizations are handling them. Volunteers may greet visitors, do clerical work, and solicit or help distribute donations of food, clothing, fuel, and other necessities for the center's clients.

Develop a one-to-one relationship with a youngster who has had few positive influences in his or her life. The Big Brother and Big Sister programs offer opportunities of this kind. So do welfare and probation depart-

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ments, YMCA's and YWCA's, Boys' Clubs, Girls' Clubs, and family service programs run by Catholic, Protestant, and Jewish organizations.

Involve yourself in the activities of a neighborhood or community center. You can develop organizational and leadership skills by helping direct children in sports, arts and crafts, music, or drama. You might tutor children or adults. Or you might work on fund-raising and publicity for the center's programs. All of these activities will give you experience organizing social service programs and working with people.

Invite a social worker to speak to your class about his or her job. Ask the speaker to explain what he or she does and to mention the rewards and frustrations of the work. Prepare questions ahead of time.

Look for opportunities to work with people of different ages and backgrounds.

- Volunteer to help with younger children at a day camp or summer recreation program.
- Spend time with handicapped or retarded children. Girls' Clubs, Boys' Clubs, Red Cross, Scout troops, Campfire Girls, and other youth organizations offer such opportunities.
- Volunteer to entertain or visit residents in a nursing home.

If you are a Boy Scout, try for a merit badge in Family Living. Test your interest in working with and learning about your family and others.

If you are a Girl Scout, try for proficiency badges in child care. Caring for children may test your interest in a career that requires concerned interaction with others. Also, see if your local troop has the From Dreams to Reality program of career exploration. Troops also sponsor service aide and community action projects.

Join a Child Care, Communication, or Social Work Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

For information about career and education opportunities in the field of social work, write to the National Association of Social Workers, 1425 H Street, N.W., Suite 600, Washington, D.C. 20005, and to the Council on Social Work Education, 345 East 46th Street, New York, New York 10017.

Volunteer work is a good way to explore a career in social service.

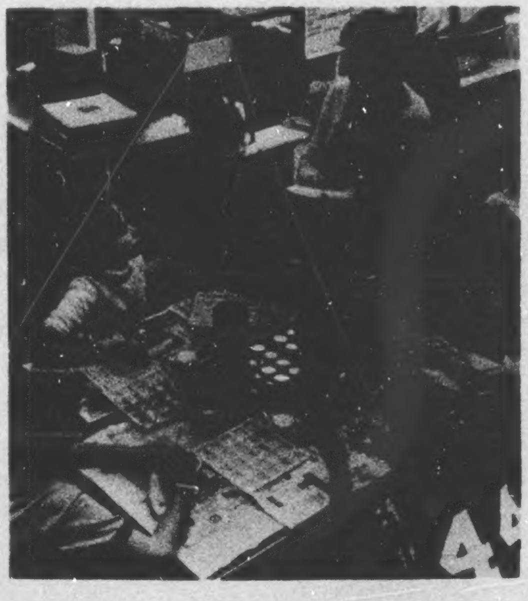
Related Occupations

Social workers aren't the only people who help individuals and groups with problems. Eight jobs are described below. Unscramble the letters to discover who these workers are:

1. OPLRAE CREFIFO. I work with law offenders when they get out of jail. I advise them about completing school or getting job training and help them look for a job and a place to live. I try to learn enough about them and their backgrounds to have some real influence; my goal is to help them find a way of making an honest living.

2. CTAIERERNO RLADEE. I organize recreational activities such as arts and crafts, sports, games, music, dramatics, camping, and hobbies. I work with groups of people in camps, community centers, YMCA's and YWCA's, senior centers, and other places.

Volunteer experience as an activity leader or camp counselor can lead to a full-time job.



Recreation workers help people enjoy themselves.

3. REWKERCSAO. I help individuals and families who need the assistance of a social service agency. I interview clients with problems ranging from runaway children to illness, no money, and eviction. I listen first. Then I try to help my clients work out a solution. Often I put them in touch with other agencies that can help, too.

4. STRENIMI. I provide spiritual leadership within my community.

5. BAOPRONIT CREFIFO. I work with law offenders while they are on probation. Sometimes I decide which juvenile cases belong in the courts and which should be handled by a social service agency.

6. CHSOLO SEROLUNOC. I help students deal with things that bother them—personal problems, family problems, failing grades. I also help them plan courses and school activities that best fit their interests and abilities.

7. NITYUMOMC NATIGROONIZA WKEROR. I work with community groups and advise them on the kinds of action that will meet their interests and needs. I work with all kinds of groups: Senior citizens afraid of crime, tenants facing a rent increase, street gangs, children with no place to play, parents trying to organize a day care center. I help the group organize, raise funds, and take action.

8. CILOAS FAREWEL MINIADTRATORIS. I run a social service agency. As an administrator, it's up to me to see that the agency's programs meet our clients' needs—that people in real trouble don't run into a lot of red tape, for one thing. Selecting, training, and supervising the staff are important parts of the job. Representing my agency to community groups and citizens is also important and I frequently go to meetings and make speeches.

Caseworker
Community organization worker
Minister
Parole officer
Probation officer
Recreation leader
School counselor
Social welfare administrator

See answers at end of chapter.

Social Service Occupations

Job Facts

There isn't room in this book for a story about every social service occupation. However, you'll find some important facts about 13 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the *Occupational Outlook Handbook*, a publication of the Department of Labor which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
COUNSELING OCCUPATIONS			
School Counselors	School counselors help students understand themselves and resolve their problems. They give aptitude, interest, and ability tests. They hold individual and group sessions so that students can "talk through" their concerns. They may teach classes in occupations and careers or other special subjects. Most counselors work in elementary or secondary schools.	A master's degree in counseling and some teaching experience usually are necessary. Most States require school counselors to have counseling and teaching certificates. The education and experience requirements for these certificates vary among States. School counselors must be able to deal with all types of people. They work with students, parents, teachers, and school administrators.	Some counselors work part time as consultants for private or public counseling centers, government agencies, or private businesses.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
College Career Planning and Placement Counselors	These workers help college students and graduates examine their career goals and find jobs. Sometimes they arrange for job recruiters to visit the campus and set up interviews with students. They work for colleges and universities and for community and junior colleges.	A bachelor's degree in psychology or sociology is customary for a job in this field. A master's degree in clinical or counseling psychology is helpful. People in this field should be energetic and able to work under pressure because they must organize and administer a wide variety of activities. They must have an interest in people and be able to get along with them easily.	These workers also are known as college placement officers. These workers frequently work more than 40 hours a week. The workload is especially heavy during the recruiting season.
Employment Counselors	Employment counselors help people who are looking for jobs. They interview job seekers to find out about their interests, training, work experience, and personal traits. Then they may suggest specific jobs and how to apply for them, or recommend job training. They also contact employers to find out what kinds of workers they need. Over half work in public employment service offices located everywhere in the country. Many work for private employment agencies. Some work for community agencies concerned with finding jobs for teenagers, ex-offenders, handicapped persons, older workers, and other people in special need of counseling.	Training requirements vary depending on the employer. A bachelor's degree generally is the minimum educational requirement, and many jobs require graduate courses in counseling plus counseling experience. Many agencies prefer to hire people with a master's degree in counseling or in a related field such as psychology or personnel administration. Persons who want to be employment counselors should have a strong interest in helping others make vocational plans and carry them out. They should be able to work independently and to keep detailed records.	Well-qualified counselors with experience may advance to supervisory or administrative positions in their own or other organizations. Some may become directors of agencies, or area supervisors of guidance programs; some may become consultants; and others may become professors in the counseling field.
Rehabilitation Counselors	Rehabilitation counselors help people who are mentally or physically disabled or emotionally disturbed. They give them the support and encouragement they need to live with a disability, learn a job skill, or adjust to a new way of life. Counselors may find jobs for disabled persons and follow their progress. Many counselors specialize. They may work exclusively with blind people, alcoholics, drug addicts, the mentally ill, or retarded persons. They work in rehabilitation centers, sheltered workshops, hospitals, and special schools and training institutions.	A bachelor's degree is the minimum educational requirement. The master's degree in rehabilitation counseling or vocational counseling often is preferred. A master's degree in psychology, education, or social work also provides a good background. Work experience in related fields is also an asset. Because they deal with the welfare of individuals, the ability to accept responsibility is important. Patience, the ability to motivate others, and emotional stability are important in dealing with severely disabled people.	Rehabilitation counselors generally work a 40-hour week or less, with some overtime work required to attend community and civic meetings in the evening.

Social Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
CLERGY			
Protestant Ministers	Protestant ministers lead their congregations in worship services and administer the rites of baptism, confirmation, and Holy Communion. They prepare and deliver sermons and instruct persons who wish to join the church. They counsel church members, visit the sick, comfort the bereaved, and serve church members in many other ways. Most ministers serve individual congregations in churches throughout the country. Some work as chaplains in hospitals, prisons, and the Armed Forces. Still others work in social service agencies or community organizations that serve youth or families.	Educational requirements vary greatly among the various Protestant denominations. Many require a 3-year course of study in a theological school or seminary following college graduation. All ministers must be ordained by their denomination.	Persons who are interested in entering the Protestant ministry should seek the counsel of a minister or church guidance worker.
Rabbis	Rabbis are spiritual leaders for their congregations and teachers and interpreters of Jewish law and tradition. They conduct religious services, deliver sermons, visit the sick, help the poor, comfort the bereaved, supervise religious education, and involve themselves in community affairs. Rabbis serve congregations in all parts of the country. Some serve as chaplains; others work in Jewish community service agencies; still others teach Jewish studies in colleges and universities.	To become eligible for ordination as a rabbi, a student must complete a prescribed course of study in a seminary. Entrance requirements and curriculum depend upon the branch of Judaism with which the seminary is associated. Courses studied in Jewish seminaries generally provide students with knowledge of the Bible, Talmud, Rabbinic literature, Jewish history, and theology, and courses in education, pastoral psychology, and public speaking.	Nearly all rabbis serve Orthodox, Conservative, or Reform congregations. Persons who are interested in becoming rabbis should discuss their plans for a vocation with a practicing rabbi.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Roman Catholic Priests	Roman Catholic priests attend to the spiritual, pastoral, moral, and educational needs of members of their church. They conduct religious services, administer the Sacraments, give sermons, visit the sick, comfort the bereaved, help the poor, and work on behalf of the community in many ways. Most priests serve Catholic congregations in all parts of the country. Some, however, teach or do administrative work instead. They work in Catholic seminaries, colleges and universities, and high schools; in Catholic social service and welfare agencies; and in missionary organizations.	Preparation for the priesthood generally requires 8 years of study beyond high school. Over 450 seminaries offer this training.	There are two types of priests: Diocesan and religious. Diocesan priests work individually within a parish, while religious priests work as part of a religious order. Young men interested in entering the priesthood should seek the guidance and counsel of their parish priest.
OTHER SOCIAL SERVICE OCCUPATIONS			
Cooperative Extension Service Workers	These workers conduct educational programs for rural residents. They give farmers technical advice; help farm families learn about home economics and home management; organize activities for youth; and help community leaders plan economic development. Extension workers usually specialize. They may deal primarily with farmers; with community leaders; or with youth.	Extension workers must have at least a bachelor's degree in their subject field. They often receive additional training on the job. They should like working with people and have a genuine desire to help them. A farm background is almost a requirement for agricultural extension workers. High school courses in English, public speaking, science, and math are helpful.	Most extension service offices are located in small towns. People who are good at teaching and getting ideas across, and who wish to live outside the city, may find extension work the ideal career.
Home Economists	Home economists work to improve products, services, and practices that affect the comfort and well-being of the family. Most home economists teach. Others do research or test products for business firms and trade associations. Still others do research or serve as consultants for agricultural experiment stations, colleges, universities, and private organizations. Some advise and counsel the public on home management, consumer issues, and family budgeting.	A bachelor's degree in home economics qualifies graduates for most entry positions in the field. A master's or doctor's degree is required for college teaching, certain research and supervisory positions, work as an extension specialist, and for some jobs in nutrition. The ability to write and speak well is important. High school courses in home economics, speech, English, health, mathematics, chemistry, and the social sciences are helpful.	Employment of home economists is affected by growing public awareness of the contributions that can be made by home economists in child care, nutrition, housing and furnishings design, clothing and textiles, consumer education, and ecology.

Social Service Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Homemaker-Home Health Aides	These workers come to people's homes and help with routine health care, shopping, cooking, cleaning, and many other everyday chores. Usually, their help is needed because the client is sick or disabled and has no family or friends to take care of these things. Sometimes, the client is a parent whose small children require care. Homemaker-home health aides are employed by public health and welfare departments, private health care agencies, and nonprofit community health or welfare organizations, such as visiting nurse associations. Some work for hospitals and nursing homes that have home care programs.	A high school education is recommended, but not required. Aides are trained on the job. A sense of responsibility, the desire to help people, and a willingness to perform hard work are important to this job.	Nursing students or college students in appropriate fields such as home economics or social work can often find summer work as aides.
Park, Recreation, and Leisure Service Workers	These workers plan, organize, and direct individual and group activities that help people enjoy their leisure hours. Most work for city and county park and recreation departments and State park systems. Others work for National Parks, the Peace Corps, Vista, Boys' and Girls' Clubs, senior centers, hospitals, private amusement parks, and apartment complexes.	A college degree in recreation and leisure services is an asset. Creativity, the ability to motivate people, and good health are useful personal attributes for potential recreation workers.	There are numerous opportunities for volunteer work in this field.

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Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Social Service Aides	These workers serve as a link between professional social workers or rehabilitation counselors and people who need help. They explain the services the agency provides, help clients fill out forms, and keep records. Aides often specialize. Their job titles reflect the kind of work they do: Income maintenance worker, casework aide, neighborhood worker, employment aide, chore worker, and homemaker-home health aide. Almost all work for social service agencies run by local health or welfare departments or by voluntary or religious organizations. Some work in hospitals, clinics, community health programs, schools, and public housing projects.	A high school education is recommended, but not required. Persons seeking jobs in this field should get along well with people and be able to work as part of a team. They should be tactful, courteous, and want to help others.	Opportunities for part-time work are very good.
Social Workers	Social workers help individuals, families, groups, and communities understand and deal with their problems. Most social workers are employed by social service agencies run by State and local governments; voluntary organizations such as the Salvation Army; and by religious organizations such as Catholic Charities. Some are college teachers, researchers, or consultants. Others are in private practice and provide counseling services to individuals and groups.	For many jobs, a master's degree in social work is required or preferred. This takes 2 years of study after college and includes a "field placement" that provides actual job experience. For other jobs, a bachelor's degree—in social work, psychology, sociology, education, or a related field—is sufficient. Many States require that social workers be licensed.	Students should get as much related work experience as possible during high school and college to see whether they are interested and able to do the work. Working part time as a social service aide is a good way to obtain this experience.

Answers to Related Occupations

MINISTER

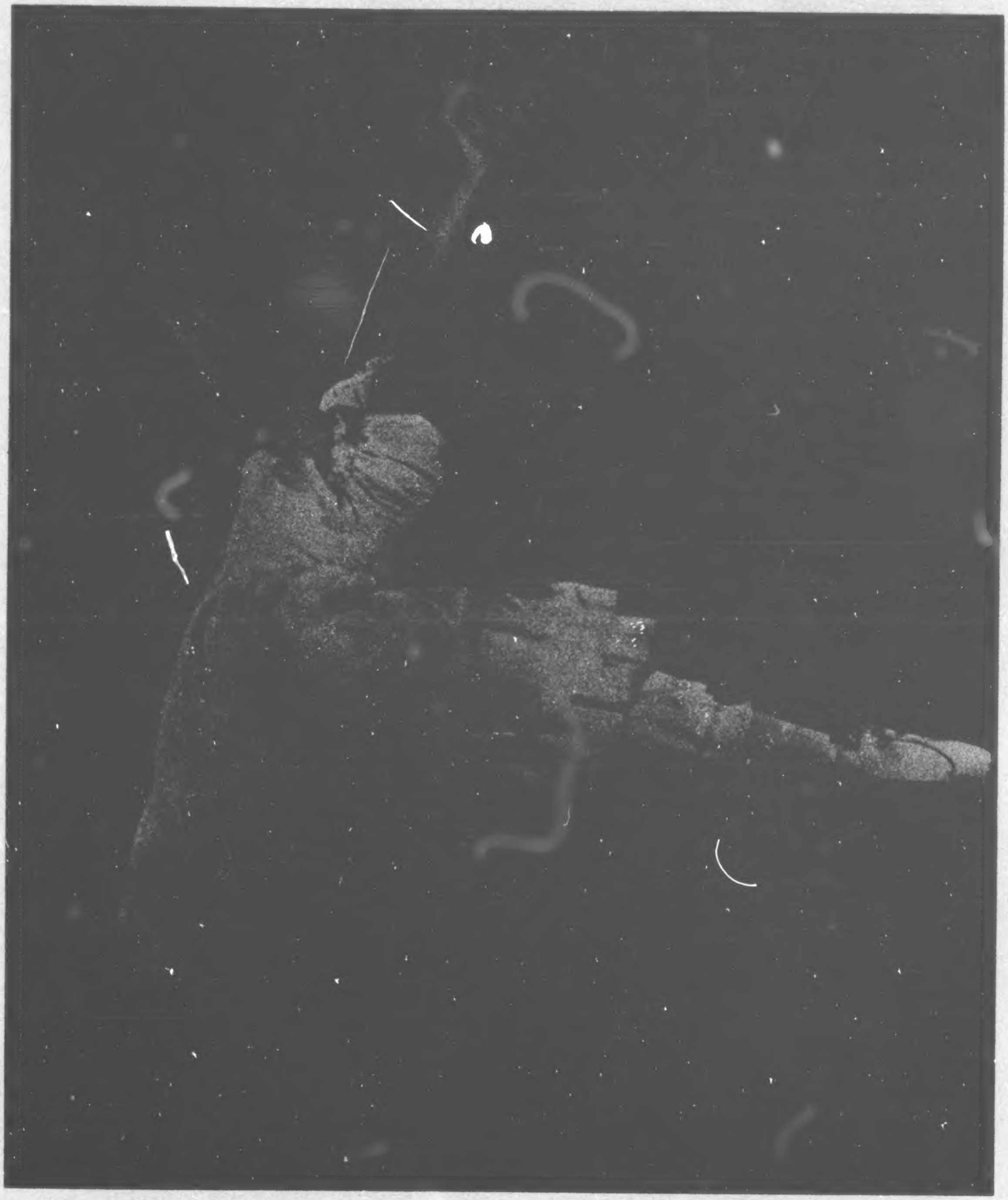
1. Rabbi, 2. Chaplain, 3. Social worker, 4. Priest, 5. Missionary, 6. School counselor 7. Christian Science practitioner, 8. Psychologist.

SOCIAL WORKER

1. Parole officer, 2. Recreation leader, 3. Caseworker, 4. Minister, 5. Probation officer, 6. School counselor, 7. Community organization worker, 8. Social welfare administrator.

Exploring Careers

Performing Arts, Design, and Communications Occupations



It takes creativity to dance in a manner that moves an audience.

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Exploring Careers

"Bravo!" The applause was thunderous. The curtain opened once more and the performers took a final bow. As the curtains swung closed again, the auditorium lights came on.

Backstage, Sally and Betsy hugged each other in delight. Jake, Kevin, and John laughed and talked excitedly. They had good reason to be elated: The play had been a huge success.

"You were terrific!" John told Sally. "You really had the audience in the palm of your hand."

"I knew they were with me," Sally agreed. "I could feel their support. And they loved you too!"

Liz Swoyer, the drama teacher who had directed the play, rushed over to the students. "You were marvelous!" she said happily, embracing each one in turn.

"I guess we've learned the secret of success in performing," John said, looking over at Ms. Swoyer. "You have to win the audience over—get them on your side."

"Well, that's true," Ms. Swoyer agreed. "But it's easier said than done. Getting the audience to sympathize and identify with you takes talent and hard work. You know yourselves how much practice you had to put in to get your lines just right and learn the action too. Each of you spent weeks trying to become the character you portrayed."

"Right," responded Kevin emphatically. "After a while I felt as though I could say my lines in my sleep."

"Me too," joined in Betsy, "I became so familiar with the character I was playing that I thought I knew how she would react in any situation."

Ms. Swoyer smiled and continued, "Of course, you're all talented and creative; that's important."

"It certainly is," laughed Jake as he looked at John. "You were pretty creative when you forgot your lines in the second act and had to ad lib. That was quick thinking—I'm sure nobody noticed."

"That's right," Ms. Swoyer joined in. "That was creative. So were the gestures you all incorporated into your roles. Betsy, when you started crying in the last scene I saw tears in the eyes of several people in the first row. It takes a great deal of creativity to interpret drama, music, or dance in a manner that moves an audience."

Getting the audience to identity with you takes talent and hard work.

"You know," said Kevin, "I really was nervous before the show. I was sure my voice would crack, or I'd trip and fall, or my mind would go blank. I'm surprised at how quickly I lost my nervousness once I started saying my lines. I completely forgot my fears once the play began."

"You all handled yourselves very well," Ms. Swoyer said warmly. "Stage fright has ruined many a performance. Luckily, none of you seems to have a big problem with that. Stage presence is probably one of the most important qualities you need for success as a performer. As you probably know by now, stage presence is largely a matter of self-confidence. For some performers, it takes a long, long time to develop that self-confidence, and the jitters never really go away."

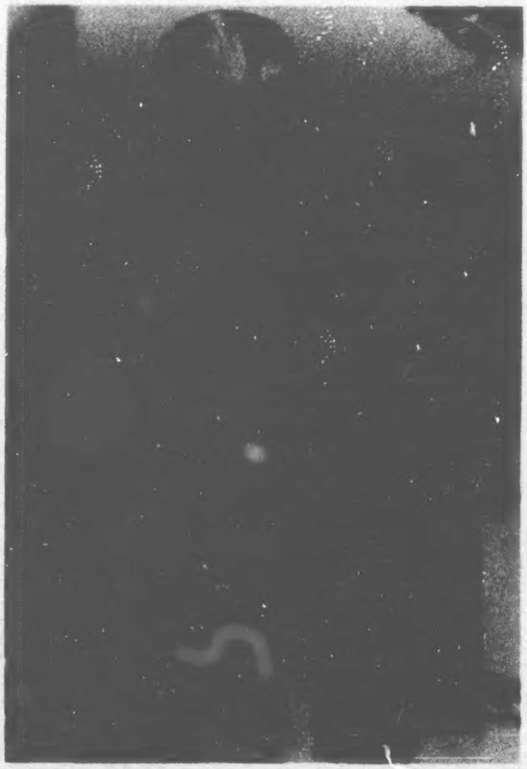
Jake spoke up. "Even though talent and creativity are very important, they're not enough to guarantee success. A good performance also requires practice and hard work. And even those aren't enough if the performers don't have that special magic called stage presence."

"You put that very well, Jake," replied Ms. Swoyer. "But if you're already considering a career as an actor on the basis of tonight's triumph, there's one more thing to remember. Success in the performing arts often is a matter of sheer luck. No matter how good you are, there's no guarantee of success."

"Well," said John, "I'm so happy with the way things went tonight that I don't really care about finding the key to success. We can worry about that when we start rehearsing our next production. After we take off our stage makeup, why don't we all go over to my house for some music and food?"

Performing Arts Occupations

John, Betsy, and the other students so happily enjoying their moment of glory are amateur performers. Whether amateurs at Middlesex Junior High or professionals on Broadway, people in the performing arts are involved in creating and communicating ideas and emotions. Through their art, they're trying to say something about what it's like to be alive. Sometimes the message is



A good performance also requires many hours of practice.

Stage presence is one of the most important qualities for success as a performer.

Performers communicate feelings and emotions.

All kinds of performers use their talents to entertain people.

thoughtful, serious, profound; other times, it's joyful, lighthearted, even silly. In any event, when performers share their talents with an audience, they express themselves in a highly creative and personal manner. Indeed, for people with the personality, the talent, and the drive, the performing arts offer outstanding opportunities for self-expression.

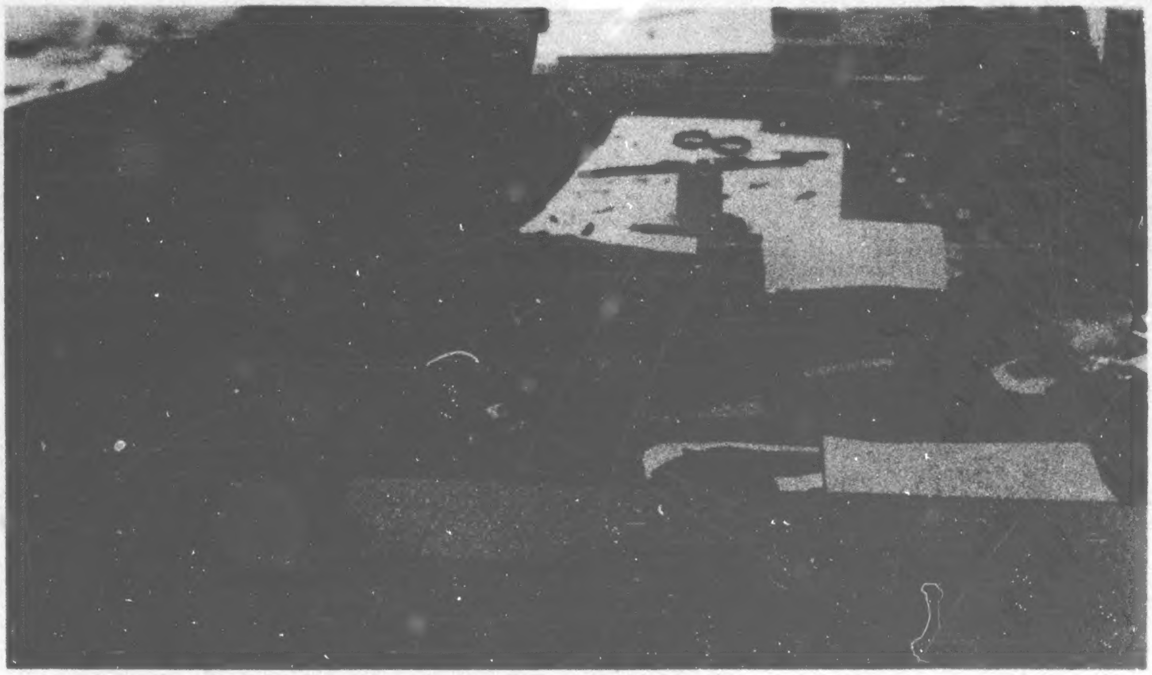
We've already met some *actors and actresses.* What other performers come to mind? *Musicians,* perhaps—jazz musicians, folk musicians, rock musicians, members of symphony orchestras or chamber music ensembles, solo guitarists, violinists, pianists, and organists. Then there are the *singers*—opera singers, folk singers, pop singers, country and western singers, choral singers. And *dancers*—tap dancers, modern dancers, ballet dancers, chorus dancers, nightclub dancers. *Comedians* tell jokes to amuse people. *Magicians* perform sleight-of-hand to amaze and delight their audiences. *Mimes* act out scenes or imitate objects or animals using gestures but no words. *Television* or *movie stunt people* substitute for regular actors in scenes that require daredevil feats. Circus performers such as *lion tamers, tightrope walkers,* and *trapeze artists* thrill their audiences with daring deeds. *Clowns* make people laugh. *Gymnasts* and *figure skaters* fill crowds with admiration at their grace and skill.

What does it take for a career in the performing arts? *Talent* is probably the most essential quality for a performer. Without talent, all the years of study and practice may be wasted.

The performing arts are different from other arts in that the performer is an essential part of the product that he or she produces. That's why *stage presence* and the ability to communicate with an audience are so important. Performers must like expressing themselves in front of an audience in order to develop an exciting give-and-take with all those people on the other side of the footlights.

Other traits are needed, too. *Ambition* and *persistence* are necessary for success in this highly competitive field. Performers usually have to audition before they are hired—they have to "sell themselves" to critical producers, directors, or conductors. They may be in a show that folds because of empty houses and unfavorable reviews. There are, in fact, hundreds of reasons why performers need a temperament that urges them to keep going in spite of failures, a spirit that drives them to try, try again.

As Ms. Swoyer reminded the students, there's no guarantee of success if you decide to try a career in the performing arts. There is little financial security, working



Artists spend countless hours mastering new techniques.

hours are odd, and there sometimes is so much travel that it's hard to put down roots in a community. Yet many performers find the desire to express themselves so important that they take part-time jobs in other fields in order to earn enough money to live.

Design Occupations

People in design occupations use visual means to convey ideas and emotions. They use their hands as well as their minds to create things. Some create objects whose sole purpose is to be appreciated for their beauty. Others design objects that are meant to serve a useful purpose; the designer's aim is to make these objects attractive as well as useful. Let's explore some of the design occupations.

The works of art you see as you wander through a museum or an art gallery are examples of objects produced by people called "fine artists." The fine arts are concerned with beauty for its own sake. People who devote their lives to creating works of fine art include *painters* who paint landscapes, portraits, scenes of daily life, or abstract works. The fine arts also include the works of *sculptors*, who carve or model objects out of

This Pueblo artist uses traditional designs in his work.

Designing the layout of a book calls for a sense of balance and proportion.

clay, stone, metal, wood, and other materials, and the works of *printmakers*, who transfer images to paper, canvas, or cloth to reproduce a design they have already created.

Not many people are able to make a living solely in the fine arts. Many with an artistic flair work at jobs that have a more regular income, putting their talents to use designing the products we use every day and making our surroundings pleasant to look at. An *architect*, for example, designs the buildings you see around you. A *commercial artist* creates the artwork in the newspapers and magazines you read, on the packages and containers you pick up, and on the billboards or television commercials you see. A *display worker* designs and installs the displays in stores and store windows that attract you and other customers and encourage you to buy. A *floral designer* arranges flowers and greenery into the corsage or boutonniere you wear to a school dance. An *industrial designer* designs typewriters, telephone receivers, and other everyday industrial products—trying to make them as useful and attractive as possible. An *interior designer* decides what colors to use in a new office, how to arrange the space, and what furniture to buy. A *landscape architect* designs the lawns and shrubbery for a golf course or public garden. A *photographer* takes pictures of people, places, and things to convey an idea or tell a story.

These industrial designers are working on a full size model of a new car.

The ability to work on your own is important for people in the design field.

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Exhibit designers set up displays in museums, art galleries, and exhibitions; they figure out what objects to display and how to show them most effectively. *Costume designers* plan performers' wardrobes for theatrical productions, operas, ballets, movies, and television shows. *Clothing designers* develop ideas and patterns for the clothing we wear—everything from jackets to jeans. *Furniture designers* make sketches of new designs for the furniture in our homes, schools, and public buildings.

What does it take for a design career? *Artistic talent* is crucial. People in this field need a strong color sense, an eye for detail, and a sense of balance and proportion. An aesthetic sense, or *sensitivity to beauty*, is essential, since people in design must be aware of what is artistically good and what is not before they can produce works that are appealing to others.

Styles and tastes in art and fashion change with almost breathtaking speed, and people who work in this field need to be able to keep up. Much of the challenge of a design career lies in the opportunity to rely on your own creativity, to trust your own artistic instincts—all the while remaining open to new ideas and methods. Creativity does not always mean thinking up completely new ideas. Rather, creative expression may involve picking and choosing from ideas around you, and then bringing

A photographer must know what will make a good picture.

Floral design is taught in trade schools and community colleges.

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English courses helped this woman prepare for her editorial job.

everything together to form something quite new. *Flexibility*, the ability to adjust to change, is important.

The persistence that comes from a *belief in your own artistic vision* is, at the same time, an important trait for someone in the design field. Creative work can be frustrating, even discouraging, during periods when new ideas don't come—or when your ideas clash with those of a client. There will be times when you'll have to change a concept or layout to accommodate your client. Handling this sort of situation requires flexibility, of course, and the ability to "sell" your ideas to other people. But it also takes a sure sense of your own artistic integrity. Only with a belief in your own ideas will you know when to change a design—and when not to.

Problem-solving ability is sometimes quite important, too, for often it is the designer's job to come up with a solution to a client's design problem that is both aesthetic and practical.

Self-discipline, motivation, the ability to work independently—all are important traits for people in the design field. These workers must be willing to assume responsibility for the final product. And since they often work on tight deadlines, they need the initiative to start projects on their own, to budget their time, and to complete everything as scheduled.

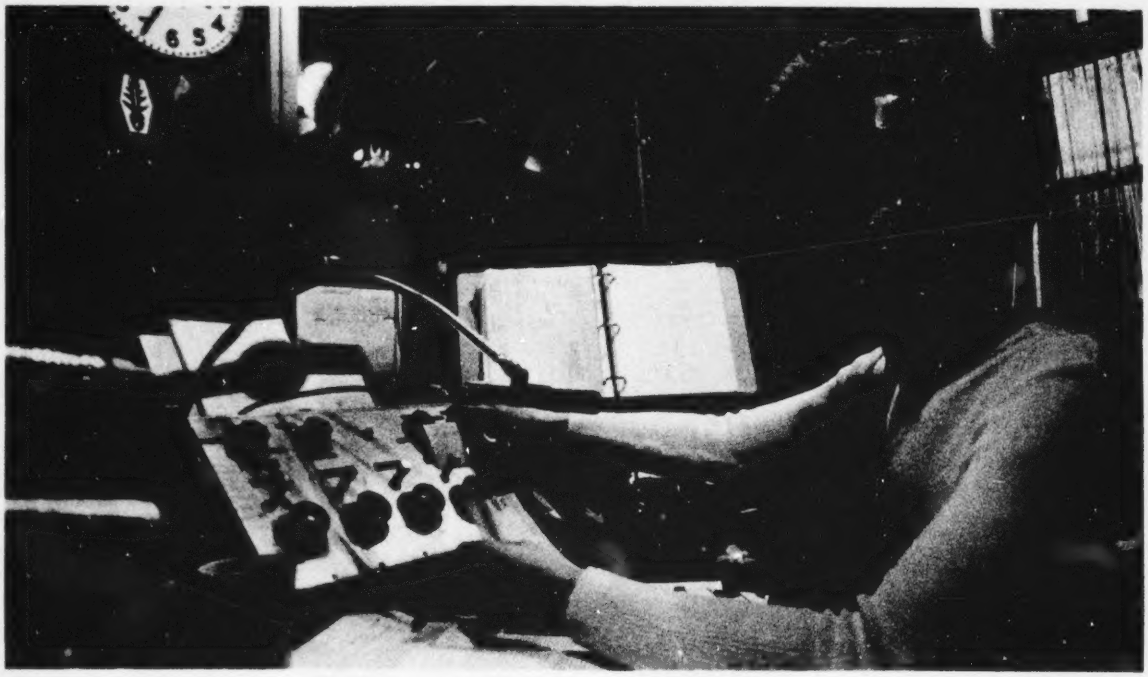
A feeling for language enables a writer to breathe life and meaning into the ordinary happenings of everyday life.

Communications Occupations

People in communications occupations deal with mental images created by words. For these workers, language is a "tool of the trade." They use the written or spoken word to inform, persuade, or entertain others and they need to be able to express themselves clearly, accurately, and in an interesting manner. Some talented people use language to express their ideas and emotions in a highly creative fashion. A *poet*, for example, captures a feeling or an event through words much as a photographer uses film. You probably are familiar with *novelists, playwrights, essayists,* and *short story writers* from your English classes.

There are many other kinds of writers, too. *Reporters* gather information on current events and use it to write stories for publication in newspapers and magazines and for broadcast. *Advertising copywriters* write the text, or "copy", for advertisements that appear in newspapers and magazines, or on radio or television. *Educational writers* write textbooks and scripts for filmstrips. *Technical writers* write service manuals, catalogs, and instructions for users of all kinds of machinery and equipment—from dishwashers to missile launching systems. *Political speechwriters* write the speeches that are given by public officials and candidates running for political office. *Joke writers* write the jokes and gags told by comedians and the skits acted out in situation comedies on television. *Script writers* write original scripts for movies and television shows, or rework books or short stories into suitable scripts. *Business and financial writers* write newspaper columns and magazine articles on economic issues. *Medical writers* write for newsletters, scientific journals, and professional and trade publications on topics in medicine and health care. *Editors* revise and coordinate the work of other writers.

People in some communications occupations do relatively little writing. *Proofreaders* read and correct copy that others have written. *Literary agents* read and appraise clients' manuscripts, and then market them to editors, publishers, and others. *Radio and television announcers* comment on music, news, weather, and sports and sometimes deliver commercials. *Interpreters* help people overcome language barriers by translating what is being said in one language into a language that the listener can understand. *Translators*, who also work with foreign languages, prepare written translations of material in another language. Many translators specialize in a particular subject, such as poetry, chemistry, medicine, or politics.



Radio announcers often have to ad lib.

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Exploring Careers

What does it take for a communications career? People in the communications occupations need an excellent *command of language*. It is through the right choice of words or phrases that interpreters and translators, for example, succeed in expressing the thought behind the factual information they convey. A feeling for language enables a poet or short story writer to breathe life and meaning into the ordinary happenings of everyday life.

Self-discipline is important in these occupations, where so many people face deadlines. Getting an article or report written by a certain date is almost entirely the author's responsibility. *Persistence* is important, too. The first effort of almost every writer—even those whose books are best-sellers—can be terrible. Professional writers can't let themselves be discouraged by this—they continue to "polish" the piece by revising, reorganizing, and rewriting it. If necessary, they tear it up and start all over.

For people in many communications occupations, acute *powers of observation* and the *ability to think clearly and logically* are necessary traits. A broadcast journalist covering a turbulent political convention, for example, needs a probing, analytical mind to discern shifting patterns of support for contending candidates and come up with a good story.

Newspaper reporters need insatiable curiosity to get all the details for a story.

Training

People in performing arts, design, or communications occupations often put in years of practice and hard work before they achieve a reputation for excellence. But they had to start out somewhere. Let's take a look now at the training needed to launch a career in one of these fields. More detailed information is given in the Job Facts at the end of this chapter.

The performing arts are noteworthy for the absence of formal educational requirements. What counts is ability or talent, not the schooling you have had. Of course, talent has to be developed through practice and guidance from skilled artists, and lessons can be quite important. Many ballet dancers, for example, begin taking lessons at the age of 7 or 8, and professional ballet dancers continue practicing for hours each day throughout their careers.

There are different ways of preparing for a career in music, drama, or dance. Many colleges and universities offer degrees in these fields, as do music and drama conservatories and schools of dance. And of course you can take private lessons with an accomplished artist.

Experience in amateur productions is very important for developing one's innate talent and stage presence. Previous performing experiences can also serve as valuable credentials which may help in landing other performance work.

The design occupations vary greatly in training requirements. On-the-job training is sufficient for some jobs. Many design occupations, however, require at least a bachelor's degree. For other design careers, a combination of formal training and practical experience is the best preparation. Bear in mind that artistic ability is the basic requirement for all design careers.

How much schooling do you need to start out in the communications field? You will find that a high school diploma is essential. Beyond that, the amount of formal education you need depends on the type of work you do. The basic requirement for all these occupations is an exceptional command of the English language. You need to be able to speak and write fluently, imaginatively, and gramatically. Community and junior colleges and 4-year colleges and universities offer programs in English, journalism, creative writing, languages, linguistics, or communications. Many universities offer advanced degrees in these subjects. Practical experience working for a school or community newspaper, or for a radio or television station, is a good background for a career in this field.

Architect

Jack Myers says, "The best part of being an architect is seeing my ideas turn into buildings that are real."

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Exploring Careers

Jack Myers takes out his key as he approaches the door with "J. Myers, Architect" stencilled in neat black letters. Unlocking the door and turning on the lights in one swift motion, he hurries into the attractive office. It is a large, cheerful room, full of light and color. But Jack is in a hurry this morning; he scarcely notices. Hanging baskets overflowing with plants fill the windows. The bright orange sofa where clients usually sit looks inviting. Across the room is Jack's desk, a broad expanse of white formica. On the walls are photographs and architectural drawings, all carefully matted and framed.

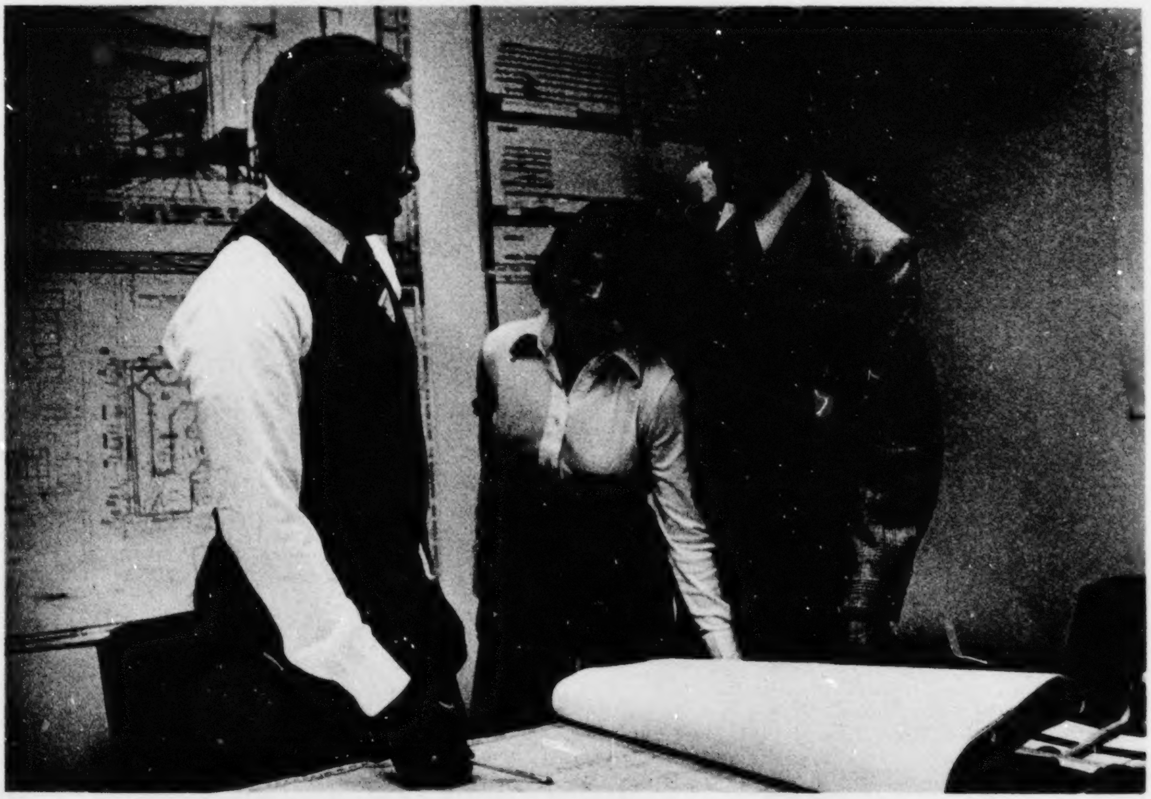
Jack notices none of this. He heads for a table in the corner, picks up some floor plans from the pile of papers and drawings there, and then settles down at his drafting table. Adjusting the lamp clamped to the top of the table, he twists in his seat to get a look at the clock: 6:45 a.m. "Three hours of drawing time before I have to take care of other things," he thinks as he bends over and begins to work.

Jack has been coming in to the office very early ever since he opened his own business about 2 years ago. That had been a big step, one he had taken only after gaining experience working with other architects in a large firm. Jack had gone to work for Jarvis Associates right after completing the 5-year college program that led to a bachelor's degree in architecture.

At Jarvis, Jack had started out with simple tasks such as tracing details from a book of standard architectural forms onto otherwise completed plans. Sometimes he would put dimensions or other notations on plans.

Later he advanced to drafting. He did the "working drawings" that the builder followed in constructing the building. Drafting was enjoyable and taught him a lot, but Jack knew almost from the start that he wouldn't be completely satisfied until he could design an entire building from start to finish. He stayed with Jarvis for about 6 years before deciding to open his own firm.

Now, because he hasn't been in business for himself long enough to develop a large clientele, he operates his office alone. That means long hours almost every day, because Jack does all of the office work as well as the architectural design and drafting. He goes to the post



An architect has to understand what clients want.

office to mail finished plans to clients, answers the telephone, makes appointments with clients, and sends out the bills. He's working much harder now than he did when he was with Jarvis Associates. But he doesn't expect to work such long hours forever! He knows that the more projects he designs, the more people will hear about him and see his work. And that, after all, is the way architects create names for themselves . . . and build up a clientele.

The plans Jack has just spread out on his drafting table are for a new home he's designing for Neal and Ellen Wright. "I've gotten to know the Wrights quite well," thinks Jack as he picks up an adjustable triangle. Knowing the client is an important part of the architect's job, for it's up to the architect to understand how a client wants to use the space that's being designed. It's the architect who translates the client's needs into something real and practical—as real and practical as a kitchen with lowered counter tops and appliances for a wheelchair user.

In fact, it's hard to believe it's been only 6 months since that first phone call, when Ellen had asked whether J. Myers, Architect, would be interested in designing the new house she and her husband were about to build. A friend had recommended Jack, she explained. Jack depends on recommendations like that from former clients to bring in new assignments; that's why it's so important that his clients be pleased with his work.

At their first meeting, in Jack's office, the Wrights had explained what kind of house they were interested in and had told him how much money they were prepared to spend. Jack had known right away that he wanted to design the Wright house. It was bound to be an interesting and worthwhile project.

After signing a contract with the couple, Jack had gone to the zoning commission office to make sure that such a project was in accordance with zoning regulations for the area where the Wrights owned land.

Later, Jack had spent some time with the entire family in order to learn how they lived—and how they wanted to use the space he was designing for them. He had asked questions about how and where they spent their time at home. He had asked about their hobbies, and had learned that Ellen had a "green thumb". She was delighted when Jack said it would be fairly easy to put in a greenhouse for her. The Wrights had definite ideas about some things. Mr. Wright wanted high ceilings, so that the house would seem as spacious as possible. Lee, their 10-year-old daughter, wanted lots of windows, especially in her bedroom. In addition to indoor growing space for plants, Mrs. Wright wanted a library or reading room. And she insisted on lots of closet space. Dani, the 8-year-old, wanted a game room for the ping-pong table the family was planning to get. Jack took notes throughout the session.

Feeling that he understood the Wrights' preferences and needs, Jack had turned to the next step—drawing up preliminary floor plans. The Wrights were excited with the plans when Jack brought them over for their approval. Like all clients, they had suggested some changes, so Jack had gone back to the drawing board. That had been almost 5 months ago.

Since then, while Jack has been drawing up more detailed plans, there have been even more changes for him to bring into his design. The Wrights, just like his other clients, seem to change their minds every week.

Being able to get along with clients is important in Jack's job. He has to treat his clients with tact and respect and consider their needs and desires. At the same time, he must gain *their* trust and respect so that they will value his opinions and suggestions and have faith in his work.

The plans on Jack's drafting table include several site plans, which show from different viewpoints how the Wright house will fit on the property. There also are floor plans, which show the layout of the rooms in the house and include such details as the sizes of the doors, the thickness of the windows, and the width of the stairways. Jack has still other kinds of plans to draw. Plans called "sections" show different vertical slices of the house and illustrate such things as insulation in the walls and roof. And he must also prepare plans that show the plumbing and electrical systems with their coded markings. On these plans, Jack will indicate where to put all the plumbing fixtures and pipes, as well as the electrical wiring system, outlets, and light fixtures. Jack is proud of the neatness and accuracy of the plans he draws.

Drawing up building plans takes more than neatness and accuracy, though. It requires a sense of beauty and harmony so that the buildings are pleasing to look at and fit in naturally with the environment. It means knowing mathematics in order to make correct measurements for the builders to follow. It means knowing a great deal about building materials, since it's the architect's job to indicate which materials will be used. It means some knowledge of structural engineering concepts—in order to know how much weight a foundation can hold, for example. And drawing skills are essential!

Jack is eager to get the revised plans to the Wrights for their approval this week so that he can get in touch with some contractors and open bidding for the project. Contractors supply the materials and skilled workers needed to construct a building. Contractors such as plumbing and electrical contractors, painters, carpenters, and bricklayers handle different phases of the job. The contractors figure out how much time, labor, and materials will be involved, and then make their cost estimate. They do this carefully, knowing that they'll have to stick to the agreed-on estimate if they get the job. Usually Jack acts as general contractor himself, coordinating the work of all the other contractors. He generally tries to get more than one estimate of cost for each construction job in order to be sure that he gets a good price.

The sound of a fire engine racing down the street breaks Jack's concentration. He looks at his watch: 9:40 a.m. "Time passes so quickly when you're absorbed in your work," he thinks. Twenty minutes later, the last changes have been made on the Wright plans. Jack rolls up the plans, fastens them with a rubber band, and wraps them in brown paper. "If I hurry over to the Post Office now, these plans should get to the Wrights before the end of the week," he thinks as he goes to the closet to get his jacket.

Just then, the telephone rings. "J. Myers, Architect," says Jack. The voice at the other end of the line identifies itself as Arthur Sullivan.

"I'm interested in renovating some rowhouses. They're about 50 years old, and could use some changes in the plumbing and electrical systems. I guess they need general modernizing, and I'd like to see some of them enlarged if possible. A friend of mine told me you're the right architect for the job."

The prospect of a renovation job appeals to Jack. In fact, when he first started out on his own, he did practically nothing else. In some ways Jack finds renovation work even more challenging than designing a new building from scratch, because renovation so often involves dealing with the unknown—unknown building materials and construction techniques, to start with. And there's the satisfaction of finding solutions to structural and design problems. How do you create more space, or more light, without tearing down the whole building and starting all over again?

Jack agrees to meet Mr. Sullivan the next afternoon to look at the rowhouses and discuss the type of work that should be done and the cost involved.

After stopping at the Post Office to mail the Wright plans, Jack drives across town to the site of a garden apartment complex he has designed. Construction is supposed to be completed by September 1, and Jack tries to visit the construction site at least two or three times a week to see how things are going. With so many people handling different parts of the job, problems seem to crop up frequently. Just last week the glass supplier had cut the window glass to the wrong size. Every delay creates a problem for Jack, whose responsibility it is to make sure the apartments are completed on time.

Today things seem to be running smoothly. Jack catches sight of the contractor and walks over to him.

"Hi, Lou," says Jack. "How are things going today?"

"Everything's running like clockwork. If things continue at this pace we'll have these apartments completed next month."

"That's a relief," Jack thinks to himself as he goes inside one of the buildings to see what progress has been made since his last visit. After asking the contractor a few questions about touch-up work that needs to be done, he walks outside for another look at the exterior of the building.

Looking up at the six buildings that make up the complex, Jack feels a surge of pride and satisfaction. "The best part of being an architect," he thinks to himself, "is seeing my ideas take shape in brick and glass and steel."

Jack decides he has just enough time to look inside some of the other apartment buildings before lunch. Afterwards, he'll head back to his office to spend the rest of the afternoon drawing—this time, working on the plans for a small library. He turns with a quick step and heads for the next apartment building.

Jack knows many building contractors. "I shop around to see who will give me the best price on a job."

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Performing Arts, Design, and Communications Occupations

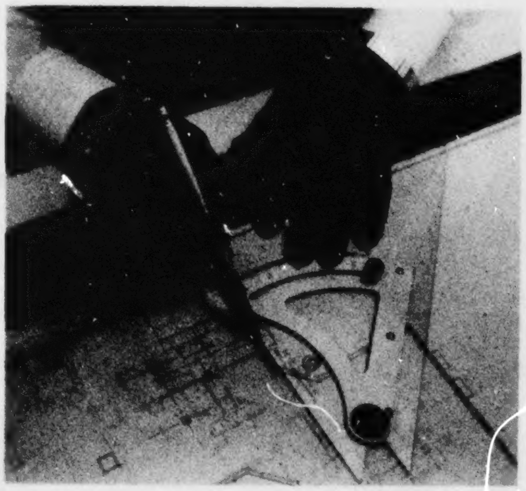
Exploring

Architects are concerned with the relationship between people and their environment. They must have an aesthetic sense as well as a practical understanding of people's needs.

- Do you notice your surroundings?
- Can you name some of the things that make your neighborhood or community pleasant to look at? Can you name things that make it unpleasant or even ugly?
- Do you notice different styles of architecture?
- Do buildings that are aesthetically pleasing or displeasing make a strong impression on you?
- Have you ever thought about the design of your school? Is it attractive? Is it functional? Can you explain why? Are the design and layout of your school similar or dissimilar to those of other schools in your community?

Architects use drawings and sketches to express their ideas. They must sketch quickly, neatly, and accurately.

- Do you like to draw?
- Do you draw landscapes? Portraits?
- Do you draw illustrations or cartoons for the school newspaper?
- Do you like to draw posters for school and community events?
- Do you draw signs and illustrations for exhibit areas in your school?
- Is the written work for your school projects neat and accurate?
- Is your homework easy to read?
- Is your handwriting neat?



"Time passes quickly when I'm absorbed in my work."

Architects have to understand how things are put together.

- Do you like to take things apart just to see how they are put together?
- Do you take apart radios, clocks, toys, household appliances, or engines?
- Are you good at doing jigsaw puzzles, crossword puzzles, mathematical puzzles, or brain teasers?
- Do you enjoy putting things together by following diagrams or written instructions?
- Do you like to sew clothes, build models, or assemble radios from kits?

Architects are responsible for many of the details involved in putting up a building. They must be good at organizing work and getting along with people.

- Are you a good leader? Do other people go along with your ideas when you're in charge of a group? Do they follow your suggestions?
- Do you enjoy working with other people on class projects?
- Do you like working with others on school clubs or committees?
- Do you enjoy organizing trips, parties, sports events, picnics, and dances?
- Do you like to coordinate cookie sales, calendar sales, car washes, greeting card sales, or other fund-raising projects?

Architects must meet deadlines. They often work under pressure, so they must be self-motivated and good at working independently.

- Are you able to stick to schedules? Do you usually get your school assignments in on time?
- Can you sacrifice leisure activities such as a movie or a baseball game when you have school work to be done?
- Do you take pride in completing projects by yourself?

Exploring Careers

Suggested Activities

Ask your teacher to arrange an architectural tour of a historic landmark in your State. There are historic landmarks in every State: Colonial communities in the East, plantations in the South, the French sector in New Orleans, Spanish missions in the Southwest, Indian and pioneer settlements in the West. In addition, almost all State capitals have buildings of historical importance, as do many older college campuses. Contact your State Historical Society, State Travel Commission, or local Chamber of Commerce for more information about historic landmarks near you.

As a project for a social studies or art class, conduct an architectural tour of a distinctive neighborhood in your community. The area you select for your tour might be the neighborhood where you live or go to school; a historic section; a riverfront or lakefront area; or the newest part of your community.

Identify several buildings in the area you select. Write one paragraph about each of these buildings, giving the street address, approximate year of construction, and interesting historical and/or architectural details. For help with your research, try the public library, a historical society, the planning department of your local government, and local architects. Prepare a drawing that includes the major buildings in your tour.

As a project for a social studies or art class, choose an interesting building in your community. Learn its history. When was it built? Have there been any additions or changes since it was built? Draw exterior views of the building. Construct a small cardboard model of it.

As a project for an art class, design your "dream house" or design a large project such as an airport or shopping center.

Ask your teacher to arrange a class visit to a construction site.

Design and build a doghouse, birdhouse, or playhouse.

Invite an architect to speak to your class about his or her job. Ask the speaker to bring some plans or drawings and explain them to the class.

Take the dimensions of your classroom as a project for a mathematics class. Then draw the room to scale, letting ½ inch equal 1 foot. Include all permanent objects in your plan, including windows, door, and radiators. Translate the measurements into metric units.

As a project for an art class, prepare a landscape design. Show the location of the lawn, bushes and shrubs, walkways, trees, flower gardens, rock gardens, ponds, benches, gazebos, and any other features you decide to include.

Invite a local building inspector to class to explain what inspectors look for when inspecting new residential buildings for approval of construction. Ask the speaker to bring copies of any forms he or she uses on the job.

Invent a new kind of structure as a project for an art or mathematics class. You might use unusual concepts such as domes, treehouses, or tents. You might use unusual shapes such as pyramids, cones, or spheres. Or you might use unusual materials such as plastic, thatch, or cardboard.

Join an Architecture Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out abut Explorer Posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

If you are a Boy Scout, try for Drafting, Landscape Architecture, Surveying, and Model Design and Building merit badges.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops may also offer opportunities to try out careers through internships and service aide and community action projects.

As a project for a science fair, design an environment for non-humans. You might want to design a "habitat" for animals in a zoo, or something as fantastic as a shopping mall for beings from Venus. If you decide to design something for beings from another planet, remember to describe them first. For example, the Venusian shopper might breathe water, see through a hole in the top of his or her head, or move by bouncing off walls.

Architects use mathematics in their jobs every day. Try your hand at the following simple examples of ways in which an architect uses mathematics:

- An architect is planning a house for a couple who do not want to spend more than $70,000. Building costs in the area are $35 per square foot. What is the largest house (in square feet) that the couple can afford?

- An architect must design a rectangular shed of exactly 200 square feet. Give the dimensions of at least three different rectangles that will fulfill the requirements.
- An architect has been commissioned to renovate an old house. The owners do not want to spend over $50,000 on the entire job, including the cost of the house, which was $22,500. The architect already has contracted out plumbing work of $3,000, electrical work of $3,500, and heating and air-conditioning work of $6,000. How much money is left for completing the job?

See answers at end of chapter.

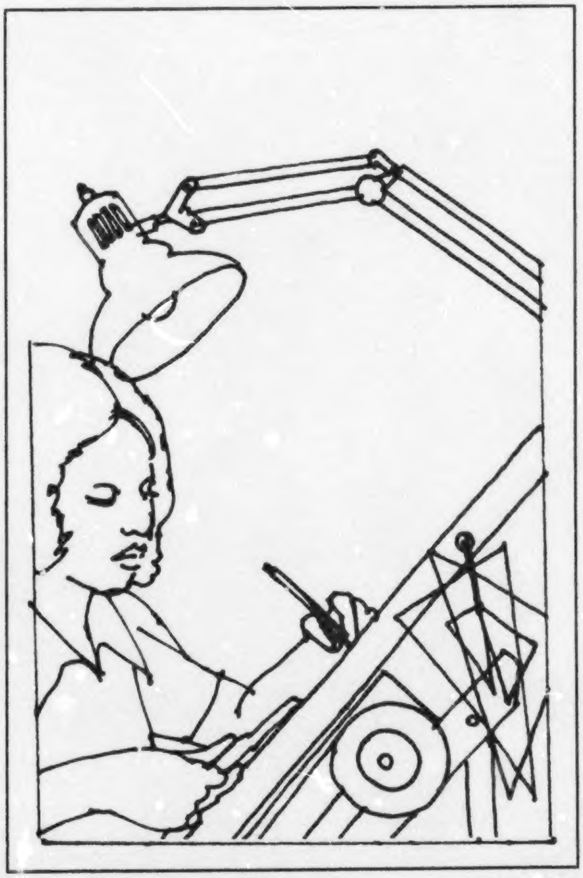
Write for career information to the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20006.

Related Occupations

Architects aren't the only people whose jobs involve planning, designing, and building objects or structures. Match the occupational title with the correct definition.

1.	Building contractor	a.	Plans lawns and gardens for parks, airports, hospitals, schools, stores, factories, and homes. May plan and arrange trees, shrubbery, open spaces, and other features, as well as supervise any grading, construction, and planting.
2.	Civil engineer	b.	Contracts to perform construction work by making an estimate of the cost of the work, submitting a bid, and having it accepted. Purchases materials and hires labor for construction, and supervises the work.
3.	Planner	c.	Prepares detailed drawings based on rough sketches, specifications, and calculations made by scientists, engineers, architects, and designers. Also calculates the strength, quality, quantity, and cost of materials.
4.	Interior designer	d.	Helps communities make decisions to solve their social, economic, and environmental problems. Develops programs to provide for future development of urban, suburban, or rural communities.
5.	Industrial designer	e.	Measures construction sites, helps establish official land boundaries, assists in setting land valuations, and collects information for maps and charts.
6.	Landscape architect	f.	Plans and supervises the design, color scheme, and arrangement of building interiors and furnishings. Estimates costs and selects materials to present to client for approval.
7.	Drafter	g.	Designs and supervises the construction of roads, harbors, airports, tunnels, bridges, water supply and sewage systems, and buildings.
8.	Surveyor	h.	Combines artistic talent with knowledge of marketing, materials, and methods of production to improve the appearance and functional design of a product.

See answers at end of chapter.



Newspaper Reporter

"The investigative side of reporting is the most challenging part of my job."

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Linda picked up the phone on the second ring.

"*The Messenger.* Good morning. May I help you?" she said in rapid-fire fashion. She was in a hurry that morning, had already taken five phone calls, and wasn't really in the mood for a sixth. But you never knew. Any call might be "the" call, the one leading to the story of the century. Or the story of the week, at any rate.

At the other end of the line, a tiny voice announced that his name was Joey, that he was 9 years old, and that he thought he had a story for her. A tree in his backyard had been knocked over during the weekend rainstorm, he explained, and two baby squirrels had been orphaned and left homeless.

Well, that wasn't Linda's idea of a big story. It might do for filler in a small-town newspaper, but it didn't have the right appeal for a weekly paper that served 35,000 suburbanites. Linda had learned from 6 months on the job that a news reporter had to know her audience in order to select suitable topics for articles. Since the paper came out only once a week, every story had to count.

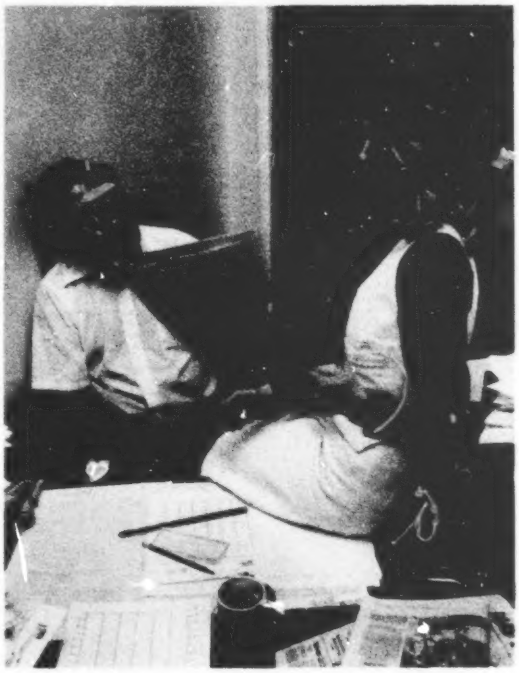
Besides, it was Tuesday, and *The Messenger* came out on Thursday. Linda was busy enough with last minute follow-ups for stories she already had begun. Not that it was too late to start looking into a new story, but it would have to be something special. Soon she'd have to start typing up all her articles for Thursday's edition. On many Tuesdays she ended up typing for 5 or 6 hours, so she had to make sure she allowed enough time for that task. Linda thanked Joey and told him she was afraid she wouldn't be able to use his story.

The Messenger was a small weekly community newspaper. Like other weeklies, it operated with a small staff: Two news reporters, one photographer, and four editors altogether. Fortunately, the two reporters weren't responsible for all the articles that went into each edition. The newspaper bought some syndicated articles and columns that also appeared in other newspapers around the country. These articles came from a syndicate, or organization, that sold them to a number of different newspapers for publication at the same time. In addition, the newspaper used a number of "stringers," freelance writers who covered specific topics such as church and garden club activities and community meetings. Juan Rodriguez was one of their best stringers. Juan was a junior at Central High, and he reported on the school's basketball games. For each of his stories that was published, Juan received $10. Another source of material for the newspaper was the press releases sent in by local government agencies, political figures, local firms, and community groups.

The door opened and Bill, *The Messenger's* other reporter, walked quietly into the office. He had just returned from interviewing one of the candidates running for an at-large seat on the school board. He dropped his note pad on his desk and fell wearily into his seat. "Boy, I can hardly wait until Thursday so I can get some sleep!" he said. Both reporters had been working long hours this week, and no rest was in sight until after the paper was completely put together.

Bill sat down at his desk, inserted a piece of paper into his typewriter, and began typing from his notes. Linda glanced around at the other four desks which, together with hers and Bill's, filled the large office. The room gave the impression of ceaseless activity, with papers scattered on all the desks, typewriters clicking, and phones ringing continuously. Once she had trained herself to ignore all the background noises, Linda found that working in this busy environment was a spur to her own activity. The energy in this room seemed to be contagious. And working so closely with others on the staff kept her aware of every aspect of producing the newspaper.

As far as the news was concerned, Linda was at the center of activity. Her workweek began on Thursday morning and didn't end until Wednesday night when the newspaper staff "put the paper to bed."



Linda and Bill discuss the stories they will cover this week.

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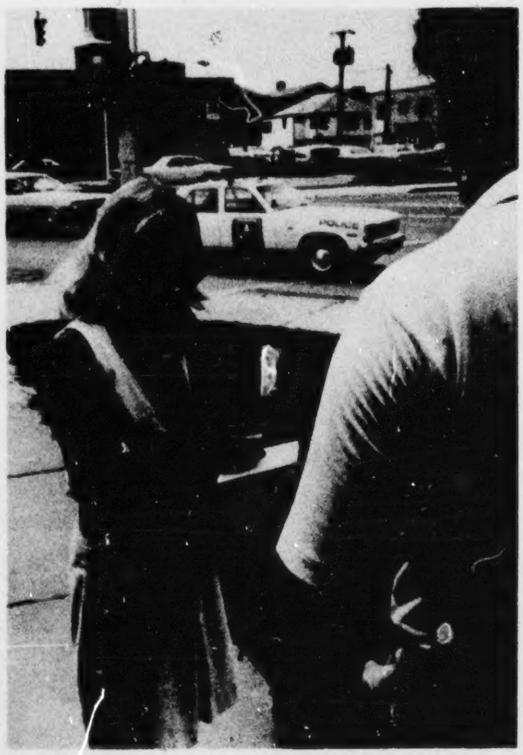
The Thursday before, Linda and Bill and the managing editor Craig, had met as they did every Thursday to put together the story lists—the list of stories each reporter would cover for the week. Stories were assigned to each reporter according to his or her beat. Linda's beat was broad; she was responsible for covering the State General Assembly, the City Council, transportation, the fire and police departments, and parks and recreation. Covering so many different areas was one of the things that Linda liked best about working on *The Messenger*. The job required a broad knowledge of the community. If she were working on a city paper, she probably would cover just one small area of news—business and finance, perhaps, or education. She might be so busy covering the news that she wouldn't even have time to write the stories herself. In that case she would just call in her stories to another writer. Linda thought she got a much wider range of experience on *The Messenger*.

Linda liked to uncover the inside story, to find out what was really going on in the community. The investigative side of reporting was the most interesting and challenging part of her job. At the same time, it probably was the most difficult part, and something she had not been fully prepared to handle when she first started work. Even with a degree in journalism! Only through experience had she learned how much research was involved in reporting, and how vital it was for a reporter to know where to go for information. Reporting for a weekly newspaper often involved more research than reporting for a daily paper would. Because Linda and Bill didn't always have the advantage of publishing a big story as soon as it broke, they compensated by spending more time on their articles. They'd do extra research into the subject or present a new slant on a story. Many times they'd take a more personal human interest approach than a reporter on a big city daily would.



"I spend a large part of my time checking out leads for stories."

To keep up to date on what was happening on her beat, Linda often had to work nights as well as days, attending meetings of the City Council, the Parks and Recreation Commission, and citizens' groups. Covering meetings, Linda discovered, was not easy, and the proper techniques were not always taught in school. Interviewing 1 or 2 people at a meeting was not enough; she often had to speak to 20 different people. And she found that she had to do research before the meeting began to find out what was scheduled on the agenda, and to explore the different sides of each issue.

Attending meetings was just one way of gathering information for stories. Linda also used leads furnished by people who were in a position to know something useful. Developing these sources or contacts in the right places was another part of Linda's job. Of course, leads didn't always come from regular sources; often they came from total strangers who called in with questions or complaints or information they thought might be of general interest. Like Joey.

Linda spent a large part of her time checking out these leads for stories, but not all of her research was fruitful. Out of a dozen or so tips, only a few would result in articles. Sometimes she did research at the local library. Other times she had to examine police records or go to the County Clerk's office at the courthouse to look through records on file there. Most of the time, though, she used the telephone to check out leads.

A few days before, someone had called in to ask why construction work was beginning on parkland owned by the county. Linda quickly found the right people to talk to: The director and the public information representative of the county park department, then the county's lawyers, then the land developer and his attorney, and finally back to the park authorities. Just yesterday Linda learned that the county had decided to take the developer to court. That was one lead that had developed into an interesting article, and Linda felt the satisfaction of having done something worthwhile for the community as well. Knowing that people depended on her for news also gave Linda a sense of responsibility.

Linda began gathering her notes from the stories she had followed during the past week. Most of her articles had yet to be composed from the fragments of notes she had hurriedly scribbled during telephone conversations or interviews. She usually ended up doing most of her composing at the typewriter—a skill that required her to think clearly, accurately, and creatively under pressure. It's not easy to write an article so well the first time that little rewording is necessary, but Linda found herself improving with practice.

Linda decided she'd better take advantage of the lull in activity and start typing her articles. She knew there were likely to be many interruptions throughout the afternoon. The typed articles had to be ready by tomorrow morning so that they could be edited, retyped, and then entered into the composing machine that would set them in columns of type.

Linda and other members of the staff would spend most of Wednesday arranging and pasting up the "flats." The flats were large sheets of cardboard on which were pasted the photographs and typeset articles that would appear in that week's edition of *The Messenger*. In pasting up the flats, the reporters followed the layout design for each page that showed placement of articles and photographs. The layout designs, called "dummy sheets," were drawn up beforehand by the editors. The pasted flats would later be photographed and metal plates made from the negatives. The metal plates would then be used to print actual copies of the newspaper.

Linda turned to her typewriter, inserted a clean page of paper, and began typing the opening paragraph of her lead article. "The next day and a half will be hectic," she thought to herself, "but by Thursday morning the paper will be out on the street." Then there would be some time to relax, at least until the new stories were assigned and the cycle started all over again. . . .

Linda helps arrange and paste up flats.

Exploring Careers

Exploring

Newspaper reporters communicate ideas. They must be good at expressing themselves in writing.

- Do you enjoy writing letters to friends?
- Do you write poetry or short stories in your spare time?
- Do you keep a diary or journal?
- Is English one of your favorite classes?
- Are you good at writing term papers?
- Are you good at doing essay questions on tests?
- Are you good at crossword puzzles, Scrabble, Password, and other word games?

Newspaper reporters need an insatiable curiosity to get all the details for a story.

- Do you enjoy talking to people?
- Are you interested in hearing many different points of view?
- Are you skeptical about things you read or hear?
- Do you check the facts before deciding whether something is so?
- Do you ask questions in class?
- If you don't understand an answer, do you ask again? Do you keep asking until you're sure you understand what a teacher or classmate is trying to say? Can you do this without rubbing people the wrong way?
- Do you use the encyclopedia?
- Do you use the dictionary to look up words you don't know?
- Do you follow current events? Do you read newspapers and magazines? Do you watch the television news?

Getting information is not always easy. Many times newspaper reporters run into obstacles when they're after a story. They need to be aggressive and confident.

- Are you outgoing?
- Are you comfortable talking to strangers?
- Do you enjoy selling tickets to dances or athletic events? Do you enjoy selling magazine subscriptions? Girl Scout cookies?
- Do you like collecting for charity drives?
- Are you confident in trying out for school activities?
- Do you strive for leadership positions in organizations?

Newspaper reporters have to rewrite their stories until they're just right.

- Do you rewrite your English papers several times before turning them in?
- Do you rewrite letters to friends?
- Do you check over your math homework before turning it in?
- Do you ever use a thesaurus when you're writing in order to find just the right word?

Newspaper reporters face deadlines all the time. They must be able to work under pressure.

- Do you get your homework assignments in on time?
- Are you able to take tests without panicking? Do you organize your time on tests to have time for all the parts?
- If a pressing deadline for a school project comes up, are you willing to spend extra time on it until it's finished, even if it means staying late after school or taking it home and working on it at night?
- Do you enjoy being busy and "on the go" all the time?

Newspaper reporters need to be flexible. Their assignments change often, and sometimes they have no advance notice at all.

- Can you work on more than one task at a time? Do you get everything done?
- Is it easy for you to go from one subject to another in your homework?
- Do you read several books at a time?
- Do you like variety and change in your weekly or daily schedule?

Newspaper reporters have to be able to think and write objectively. They should be honest, idealistic, and interested in the truth.

- Are you interested in many different points of view?
- Can you tell when someone has a biased viewpoint?
- Are you good at settling arguments with rational thinking?
- Do you believe in telling the truth even if it hurts someone?

Suggested Activities

Join the staff of your school newspaper or yearbook.

Volunteer to help with the newsgathering, editing, and production of the newsletter for your synagogue, church, or community organization.

Contact the editor of your local newspaper and offer to cover sports activities at your school.

Arrange to submit a regular column about activities at your school to your local newspaper or radio station.

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Volunteer to handle publicity for a school event such as a science fair, concert, career day, or awards ceremony. Prepare a press release; arrange for a radio interview.

Design a new kind of magazine. First decide who your audience will be, and what kinds of news and features you will include. Make your magazine different in some way from other magazines. Design the cover and the layout.

Join a writing or journalism club such as Future Journalists of America or the Quill and Scroll Society.

Creative writing is important in all journalistic endeavors. Try developing this skill through one or more of the following types of creative expression.

- Start a creative writing magazine if your school doesn't have one.
- Enter a poetry reading contest.
- Ask permission to do poetry readings over the loudspeaker before the morning announcements. You might want to read old favorites or compose your own.
- Write new words to old songs.
- Write poetry, short stories, or essays in your spare time. Ask your English teacher for comments on your work.

Write a letter to the editor of your local newspaper about an important issue in your community. See if your letter is printed.

Invite a freelance writer to speak to your English class about his or her work. Prepare questions in advance on story ideas, publication possibilities, and the pros and cons of freelance writing.

Invite the editor of a weekly newspaper and the editor of a daily newspaper to class to discuss their jobs. Explain in advance that your class is interested in learning some of the similarities and differences in their jobs.

Join a debate team or club.

Use one or more of the following topics for discussion in your English or social studies class:

- A reporter for a national newspaper must decide whether to write an article that exposes a friend's wrongdoing.
- A reporter for a small suburban newspaper is asked not to write an important piece because the publisher knows it will offend a prominent citizen.
- An editor wants a novelist to add a chapter with some violent action so that the book will sell better even though the addition will detract from the theme of the novel.
- Where should one draw the line between a newspaper's right to know facts versus an individual's or company's right to privacy?

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops may also offer opportunities to test career interests through proficiency badges in a number of areas including Creative Writer, Player Producer, and Reporter.

If you are a Boy Scout, try for Communications, Journalism, Public Speaking, or Reading merit badges.

Join a Journalism or Communications Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for career information to The Newspaper Fund, Inc., Post Office Box 300, Princeton, New Jersey 07540; Society of Professional Journalists (Sigma Delta Chi), 35 East Wacker Drive, Chicago, Illinois 60601; and American Newspaper Publishers Association Foundation, Post Office Box 17407, Dulles International Airport, Washington, D.C. 20041.

Exploring Careers

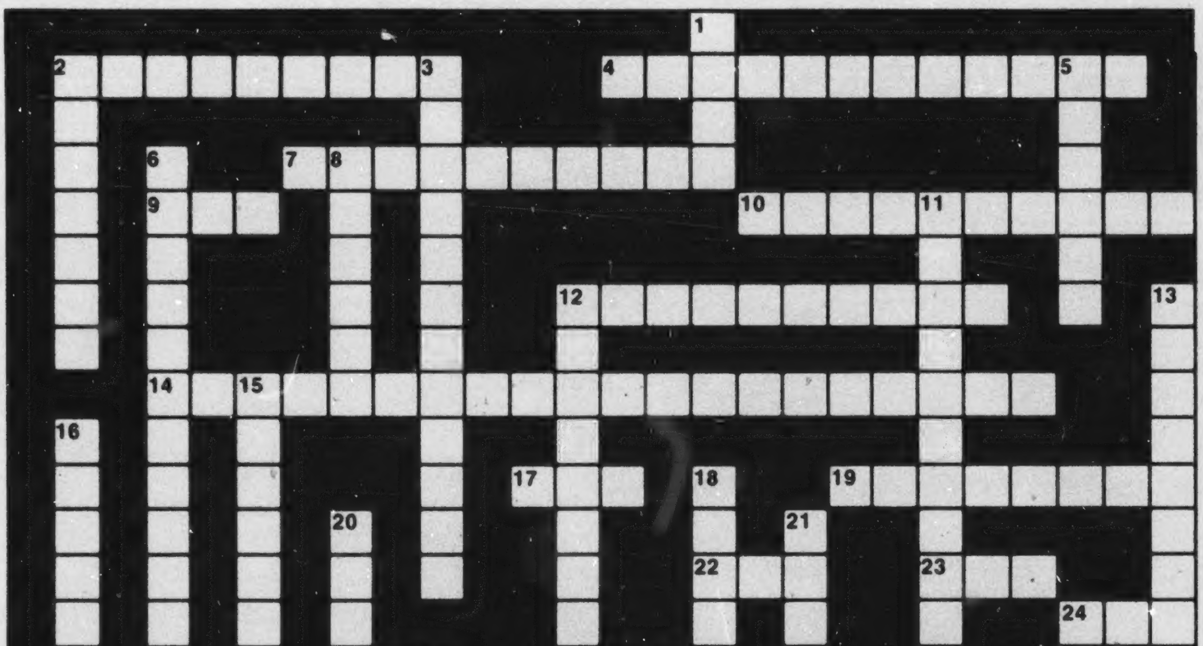
Related Occupations

Newspaper reporters aren't the only people with writing and publishing jobs. The crossword puzzle below includes quite a few writing occupations—and some newspaper "lingo" as well.

See answers at end of chapter.

Down

1. One who writes verse.
2. A(n) ________ writer creates stories about imaginary characters.
3. Artist who prepares advertising or other newspaper or magazine page layout for reproduction. (2 words)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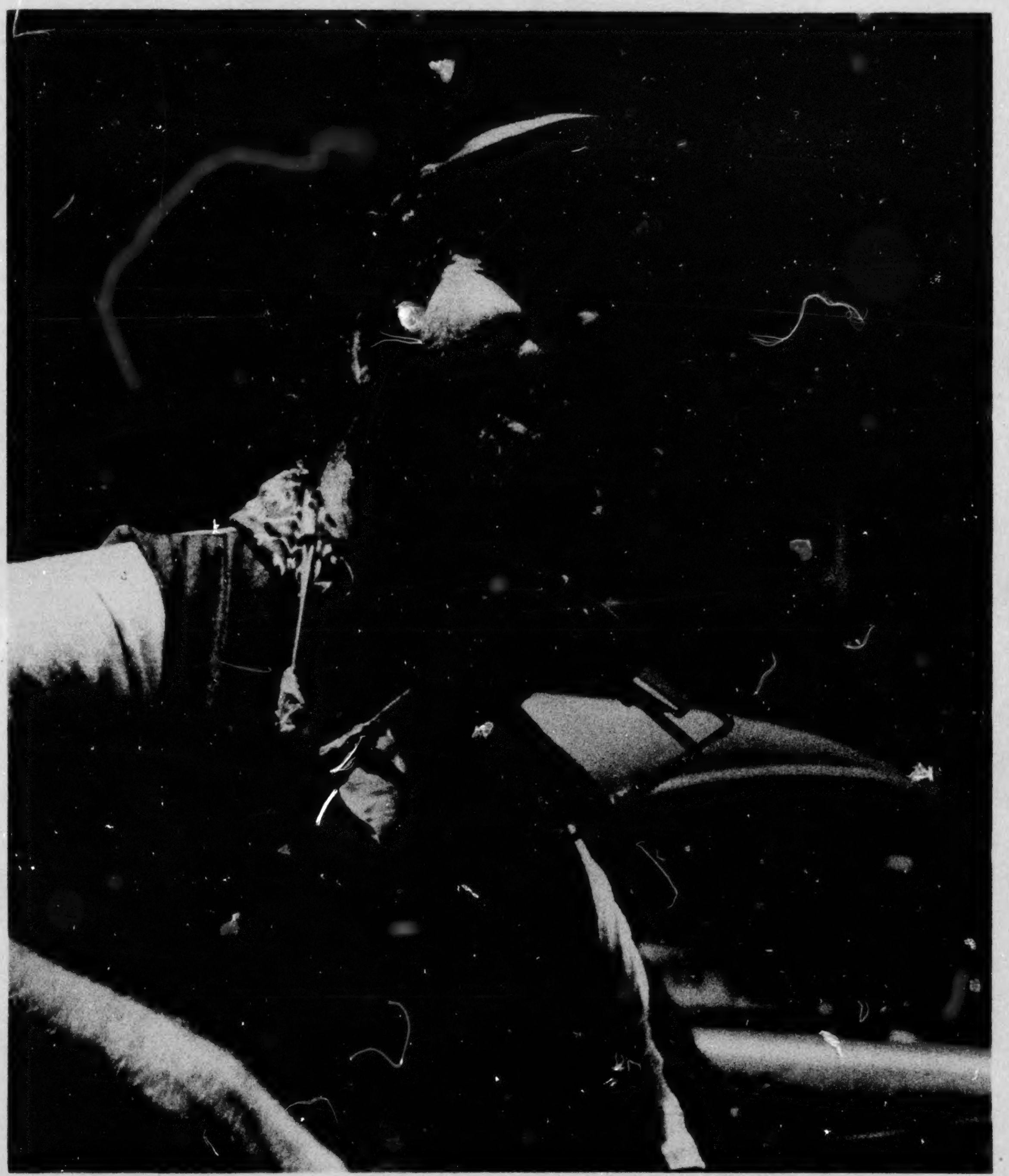
5. A person who is responsible for setting the policy of a newspaper or other periodical and deciding what will be printed.
6. Someone who writes short stories. (3 words)
8. A person who writes only the words to a song writes the ________.
11. A general term for a person who writes inventive poetry, short stories, or drama. (2 words)
12. Writes material for pamphlets or brochures. (2 words)
13. Someone who writes the messages on birthday, anniversary, and other holiday greeting cards. (3 words)
15. A person who markets clients' manuscripts to editors and publishers. (2 words)
16. This person tells a story using photographs instead of words.
18. Someone who teaches journalism. (2 words)
20. A person who writes textbooks. (2 words)
21. A newspaper writer who reviews and comments on the fine arts, such as painting, sculpture, and architecture. (3 words)
24. A newspaper staff person (often an editor) who writes an article expressing an opinion. (2 words)
27. One of the questions that should be answered by a reporter in his or her opening paragraph.
30. A(n) ________ reporter is a first-rate or expert reporter.
32. Speech writers produce *written* speeches while public speakers give ________ speeches.
34. It helps for a newspaper reporter to be a good ________ since he or she will probably spend a lot of time composing or rewriting at the typewriter.
35. A line printed above a newspaper or magazine article, telling who wrote it.
36. One of the questions that should be answered by a reporter in his or her opening paragraph.

Across

2. A(n) ________ reporter writes about money matters.
4. One who writes about or comments on newly published books. (2 words)
7. One who writes drama.
9. One of the questions that should be answered by a reporter in his or her opening paragraph.
10. One who comments on motion pictures.
12. Someone who writes an account of another's life.
14. Someone who writes material designed to promote sales. (3 words)
17. One of the questions that should be answered by a reporter in his or her opening paragraph.
19. A person who writes novels.
22. A news or wire service.
23. One of the questions that should be answered by a reporter in his or her opening paragraph.
24. Abbreviation for "English".
25. A(n) ________ reporter is a novice or beginning reporter.
26. One of the questions that should be answered by a reporter in his or her opening paragraph.
28. Someone who puts scientific and technical information into language that can readily be understood by others. (2 words)
29. A news or wire service.
31. A person on a newspaper or magazine who selects, arranges, and revises the "copy", or written material, in preparation for publication. (2 words)
33. Someone who writes about athletic events.
37. One who writes essays.
38. A newspaper or magazine reporter who sends in articles from a particular geographical location (as in a foreign "________").
39. A person who writes the written part of a play or radio show.

Street Musician



"I'm lucky to be able to support myself making music."

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Bob looks the crowd over with a practiced eye as he strides up to the busy corner in the heart of the business district. "Mostly office workers out for lunch, as usual, but there seem to be some tourists today too. Quite a mixture, in fact. They have the makings of a good audience," he thinks to himself as he begins to set up his gear.

He removes the backpack that holds his guitar and a folding stool, then sets up his speaker system and hooks the microphone into it. After removing his guitar and leaning it upright against the stool, he unpacks a large cymbal and places it on the ground. He takes several record albums out of the pack and props them up against the speaker. Next he pulls his harmonica out of a side pocket of the pack and attaches it to a brace around his neck. Finally he places a very small cardboard box a few feet in front of the stool.

"Hello, folks. How are you today?" he says into the mike as he sits down and begins tuning his guitar. A few people stop to watch, but most just continue on their way. Bob blows into the harmonica a few times, strums a chord, and then, assured that his guitar is in tune, begins to play.

"Bob Devlin's my name, and I'm going to start off today with an old ballad that you may know." With that, Bob starts to sing. More people stop to watch. As he begins the second verse, he can feel himself warming up to the song. About a dozen people have gathered around him, although most of the sidewalk traffic is still moving. As he finishes his song, a distinguished-looking man in a pin-striped suit walks over and drops some coins into the box. Bob acknowledges the contribution with a nod and a smile, then moves right into another tune. A faster one, this time. His right foot moves in time to the music, tapping the brass cymbal.

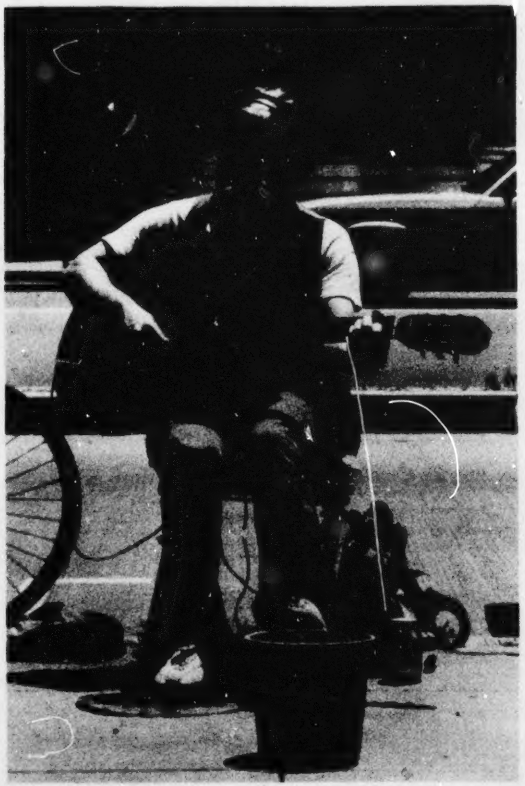
He's feeling fine. It is a beautiful summer day, sunny and warm, and Bob knows from experience what a difference the weather makes to a street musician. A balmy day like this is perfect. Bob moves quickly from one song into another, pausing between songs only now and then to talk to the people gathered around him.

A number of people know him, or at least recognize him, and call to him by name. Bob has played on this corner before, and many of the people who work in nearby office buildings are familiar with his music. They make a point of coming when they find out that he's giving a lunchtime concert here. Bob is pleased with the audience he's developing in this part of the city.

And that audience, after all, is one of the main reasons he plays on the street. The money's good—for only a few hours' work he can make $40 on a good day. But the main advantage of playing on the street is the exposure he gets. More people hear him play on this corner sidewalk than would hear him play at a coffeehouse or club. In fact, most of the club dates he's gotten lately have come about because someone from a nightclub heard him on the sidewalk, liked his music, and offered him the job. Playing on the street has actually saved him the trouble of having to go and audition.

Right now, Bob's musical goal is to make a name for himself in Washington, D.C. He wants as many people as possible to recognize his name, his face, his musical style. He hopes that as he becomes better known, more and more people will make an effort to catch his performances—on street corners, in the parks, at craft fairs, wherever he happens to be playing. Then, as his reputation grows, there will be more demand for him to perform. Later on, Bob hopes to go on tour with an established singer or group. And he expects to make more records.

Bob already has made one album. He cut the album last fall, knowing how hard it would be to make a living by playing on the street once winter came and the



Although Bob has made a record album, most of his income comes from live performances.

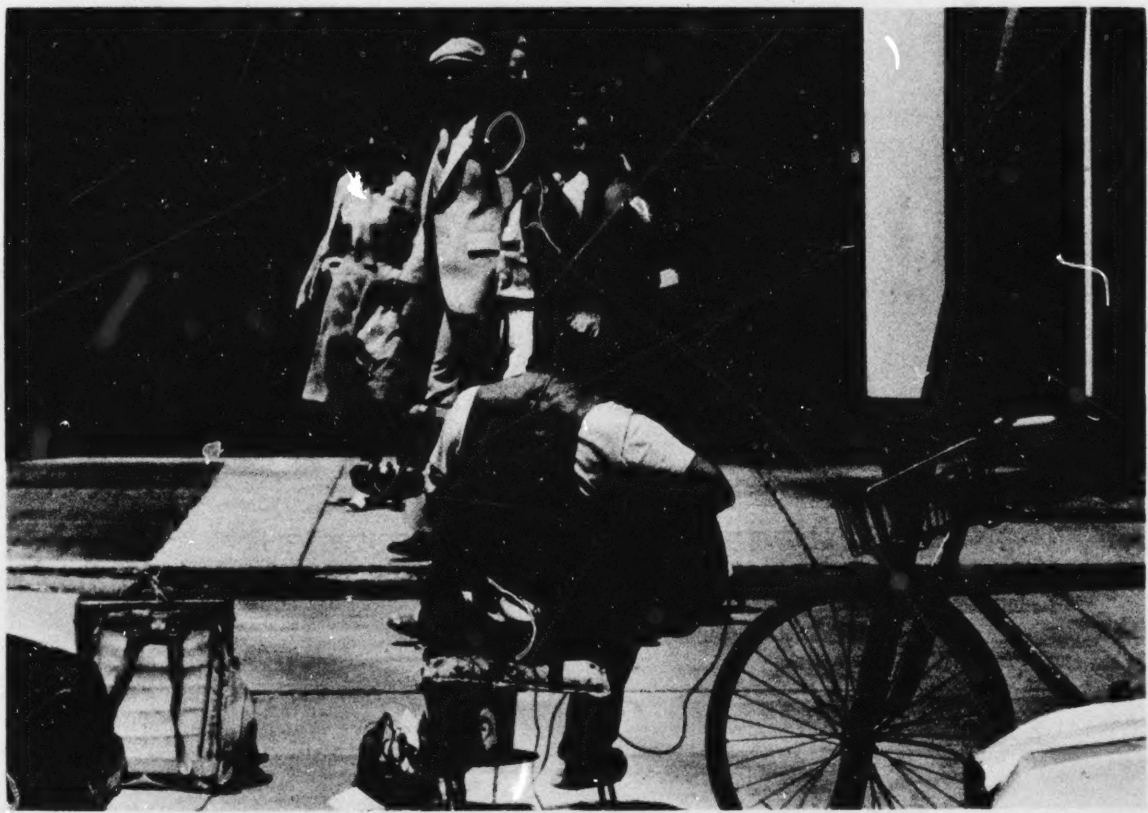
weather turned cold. Bob hoped that his record sales would bring in enough income to tide him over the winter. He sold them throughout the year wherever he played, in nightclubs, coffeehouses, and private parties.

Like all musicians who are just starting out, Bob had to cover the cost of cutting the record himself. He used his savings, around $700, and borrowed the rest from friends. He made the recording, or master tape, during a session when he was playing on the street. That saved him the expense, which can be quite substantial, of having to rent a recording studio. Later he took the master tape to a record pressing plant that transferred the taped recording onto a master disc. The master disc was then used to create the molds, called stampers, that were used in pressing the records. Having the album covers made was expensive, but Bob was able to afford both the album and the covers at the same time. In the end Bob found that the $1,100 he had was enough money to cut about 500 records.

Selling his records at $5 each, Bob was able to regain his initial investment after selling less than half of the first printing. From then on, everything he sold was pure profit. He sold all 500 records within 7 months, and, when people continued to ask to buy copies, he decided to print 1,000 more! With the master disc already made, the second printing was much less expensive. He paid for those records with money he had saved from earlier record sales.

A few college and underground FM radio stations have given his music air time, but he's found it difficult to get his music played on most of the commercial AM stations. "I'm lucky to have opportunities like this to advertise my record," he thinks as a teenager in faded jeans picks up one of the albums and then pulls a wallet from her pocket. Most of Bob's income still comes from performing, however.

As Bob finishes another song, a few people begin to clap. Soon the entire crowd is applauding. He pauses for a moment, then starts into a well-known folk tune. "You probably all know this one," he says, "so sing along if



The music Bob plays is easy to listen to and appeals to a large audience.

you like." The music Bob plays is easy to listen to and appeals to a large audience. That's part of the reason for his success. It would be harder to be a successful street musician with a classical repertoire. His rapport with his audience is another reason for Bob's popularity. He talks and jokes with the people gathered around him in a relaxed, easygoing way. At the same time, Bob attributes some of his success to downright practical considerations—picking the right time of day and the right places to play.

The crowd around Bob grows larger, and people start walking up and dropping money into his box. He continues playing, responding to the encouragement and appreciation of his audience.

Bob has been a professional musician for only a few years. He never thought seriously about being a musician when he was growing up, even though he's played the guitar since 8th grade. He never even took guitar lessons—just learned to play by ear, picking up what he could from friends. He played occasionally in coffeehouses while he was in high school and college, but at that time he thought of music as a hobby rather than as a possible career. Shortly after college, however, he decided that he was bored with his job as a shipping clerk in a warehouse. Playing on the street might be an interesting way to earn some money, he decided. So he gave it a try.

Once he started playing on the street he realized how important music was to him. All of a sudden he knew that, if he could manage it, he wanted to devote himself to music for the rest of his life. Bob feels lucky to be able to support himself by making music. For only the $15 annual cost of a vendor's license, he's able to play on the street whenever he wants, and make enough to live.

Bob knows that performing is a very competitive field, and he doesn't expect to become famous overnight. Until he does, he's content with days like today, when he's able to share his music with people on a street corner. For Bob, a life that revolves around music is reward enough.

Bob knows that performing is a very competitive field, and he doesn't expect to become famous overnight.

Exploring

Musicians have to be devoted to their music.

- Do you love listening to music? Do you often get involved in, excited by, or caught up with the music you hear?
- Would you rather go to a concert than to a movie or play?
- Would you rather play your musical instrument or sing than take part in a sports event or read a book?
- Do you ever think of songs that express your feelings?
- Do you ever write songs?
- Do you relate easily to characters in stories or movies who are musicians?
- Do you ever daydream about playing in front of an audience?

Musicians must be good at recognizing and reproducing sound differences. They need a "good ear" for music and rhythm.

- Can you tell when someone is singing off key? Can you tell when someone plays a flat note on a musical instrument?
- Can you pick up the beat after hearing just a few bars of music? Can you remember the beat to a song the next day? Do you like to tap out rhythms on desk tops or chair arms?
- Can you pick out a tune you know on a piano or guitar without reading the music?

Musical ability is only partly a matter of talent; practice is responsible for the rest. Musicians spend many hours practicing.

- Can you stick with a task to perfect it? Do you rewrite your English compositions or rework your math homework?
- How willing are you to practice the skills you have now? Do you practice the piano, typing, your foul shots for basketball, your tennis serve, or your cheerleading cheers?

Musicians, like all performing artists, have to be comfortable in front of an audience.

- Do you like being the center of attention?
- Can you speak in front of the class without getting embarrassed?
- Are you good at telling jokes?

Musicians need to be good at memorizing the words or music they perform.

- Is it easy for you to memorize words and tunes to popular songs?
- Do you have a good memory for names, phone numbers, and addresses?
- Can you remember the right keys to hit when you're typing?
- Are you good at memorizing poetry?

Musicians sometimes have to perform when they don't want to, or perform pieces that they've grown tired of.

- Can you put your own wishes aside in order to please other people?
- Can you hide your feelings from your friends when you're tired, upset, or bored?

Suggested Activities

If you play an instrument or enjoy singing, get together with some friends and form a musical group. Meet regularly; once a week is probably about right. Play for the fun of it. Offer to perform at a hospital or nursing home.

Make a tape recording of your playing or singing. Hearing yourself on tape can help you improve your sound.

Join your school band, orchestra, or chorus. Join a community orchestra or chorus. Join a church choir.

Participate in school drama or musical productions. Performing can help you develop stage presence.

Enter talent shows.

Perform in amateur nights, open stages, or even gong shows at local coffee houses or clubs. Many clubs hold these once a month or so. They are a good way to test yourself in front of a real audience, and maybe even get bookings.

If you think you're good enough, try to get an engagement to play in a local coffeehouse. The pay may be low, but the exposure will be good.

Invite a church organist, school band director, chorus director, music teacher, or other musician in your community to speak to your class about his or her career.

Use music as a topic for a report in your English class. Investigate one or more types of music such as classical, folk, jazz, country and western, rhythm and blues, rock and roll, or soul. Discuss the origins and development of the musical style you choose, and give examples of works.

Use the biography of a musician for a book report in your English class.

Try to set a limerick or poem to music. Take a familiar song and write new words for it.

List the different radio stations in your area, noting the different types of music that each specializes in.

Check out a record from your local library to learn more about different styles of music.

Ask your teacher to invite an audio-engineer or a disc jockey from a nearby radio station or recording studio to speak to your class about his or her job.

Volunteer to organize musical activities for young children at a Sunday school, nursery school, day care center, or summer camp.

As a report for your science class, find out how a computer "writes" music.

Write a musical commercial for a coming school event, organize the talent to perform it, and play it over the public address system with the daily announcements.

Take charge of coordinating the music for a school "disco" dance. This means planning what songs should be played and what order to play them in. You may want to use a tape recorder instead of a record player, and tape the songs ahead of time in the order you want them.

Not everyone working in the field of music is a performer. Production and sales, for example, are important aspects of the music industry. Invite the owner or manager of a record or music store to speak to your class about his or her business. Prepare questions in advance about running a small music business.

Compile a directory of performing music opportunities in your community, including both paid and unpaid opportunities.

Invite a piano tuner to visit your class and talk about his or her work. Ask the speaker to talk about training opportunities and job prospects.

As a report for your science or social studies class, examine the ways in which technological change has affected musicians. For example, you might explore the effect of tape recorders, radio, amplification equipment, electronic instruments (guitars, organs), cartridge players in cars, electronic equipment such as synthesizers, or computerized composition. Consider, as examples, the effect of recordings on the use of live musicians for rehearsals; the effect of the spread of discotheques on employment of live musicians; and the effect of amplification on trends in styles of music.

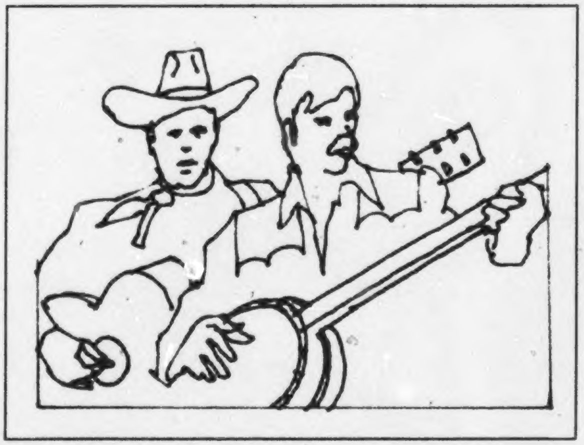
Report to your class on one of the careers you identify in the Related Occupations section that follows.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program for exploring careers. Troops may also offer opportunities to test career interests through proficiency badges in a number of areas including Minstrel and Music Maker.

If you are a Boy Scout, try for the Music merit badge.

Join a Music Explorer Post, if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write for career information to National Association of Schools of Music, 11250 Roger Bacon Drive, #5, Reston, Virginia 22090; and Music Educators National Conference, 1902 Association Drive, Reston, Virginia 22091.



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Exploring Careers

Related Occupations

There are many different jobs in the field of music. The puzzle below includes 23 of them. How many can you find? Words may be backwards or forwards, horizontal, vertical, or diagonal.

ARRANGER
CHORUS DIRECTOR
CHURCH MUSICIAN
COMPOSER
CONDUCTOR
DISC JOCKEY
FOLK MUSICIAN
INSTRUMENTALIST
INSTRUMENT CRAFTSPERSON
INSTRUMENT SALESPERSON
MUSIC CRITIC
MUSIC LIBRARIAN
MUSICOLOGIST
MUSIC TEACHER
MUSIC THEATER DIRECTOR
MUSIC THERAPIST
OPERA SINGER
ORCHESTRATOR
PIANIST
RECORD PRODUCER
ROCK MUSICIAN
STUDIO MUSICIAN
VOCALIST

See answers at end of chapter.

I	T	B	L	A	N	O	R	C	H	E	S	T	R	A	T	O	R	O	C	T	I
S	N	A	I	R	A	R	B	I	L	C	I	S	U	M	C	P	B	A	M	L	N
U	S	S	O	D	T	C	H	U	R	C	H	M	U	S	I	C	I	A	N	A	S
I	N	S	T	R	U	M	E	N	T	A	L	I	S	T	H	M	A	R	I	M	T
R	A	K	S	R	J	E	F	O	L	R	C	I	A	N	U	P	L	T	U	S	R
M	I	D	L	M	U	S	I	C	O	L	O	G	I	S	T	A	N	S	F	E	U
I	C	L	O	U	O	M	A	V	O	C	A	L	I	S	T	T	I	O	N	I	M
S	I	M	R	A	Y	A	E	S	M	A	N	C	A	R	O	C	I	P	E	T	E
T	S	Y	O	D	P	I	A	N	I	S	T	S	E	N	C	H	B	E	V	E	N
N	U	L	T	R	A	N	S	O	T	E	L	S	O	R	V	I	A	R	N	N	T
O	M	S	C	U	E	S	T	R	A	S	O	U	I	L	I	B	A	A	A	G	C
U	K	T	U	Y	B	T	I	C	F	P	A	T	G	R	R	A	R	S	I	A	R
G	L	A	D	E	V	O	H	O	M	N	I	L	S	A	C	H	R	I	C	O	A
H	O	B	N	K	S	E	G	O	A	C	R	I	E	M	O	T	A	N	I	T	F
S	F	O	O	C	R	W	C	U	F	T	E	N	T	S	R	I	N	G	S	S	T
A	R	E	C	O	R	D	P	R	O	D	U	C	E	R	P	N	G	E	U	N	S
X	S	L	A	J	H	O	U	S	T	A	V	I	R	S	T	E	E	R	M	R	P
M	U	S	I	C	T	H	E	R	A	P	I	S	T	A	O	P	R	L	K	P	E
J	O	H	P	S	T	U	D	I	O	M	U	S	I	C	I	A	N	S	C	T	R
O	M	U	S	I	C	T	H	E	A	T	E	R	D	I	R	E	C	T	O	R	S
R	O	S	I	D	G	U	A	V	I	S	E	N	T	U	P	T	P	I	R	N	O
E	D	P	R	U	R	O	T	C	E	R	I	D	S	U	R	O	H	C	P	A	N

Performing Arts, Design, and Communications Occupations

Job Facts

There isn't room in this book for a story about every performing arts, design, and communications occupation. However, you'll find some important facts about 19 of these occupations in the following section. If you want additional information about any of them, you might begin by consulting the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
PERFORMING ARTISTS			
Actors and Actresses	Actors and actresses perform in stage plays, motion pictures, radio and television programs, and commercials. In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer, stock companies in surburban and resort areas provide jobs, too. Acting jobs in "little theaters", repertory companies, and dinner theaters are available year round. Employment in motion pictures and film television is centered in Hollywood and New York City. In television, most opportunities for actors are in New York, Los Angeles, and Chicago, at the headquarters of the major networks. However, some local television stations employ actors, too.	Talent is the most important qualification for a career in acting. Creativity and imagination, expressive ability, a clear, well-trained voice, poise and stage presence, and the ability to memorize are essential ingredients. Perseverance and the ambition to succeed are also important. Previous experience, including amateur productions, is very helpful in getting a professional acting job. Formal training in acting is also important. Colleges, universities, and dramatic arts schools offer courses and degrees in drama. Training and practice continue throughout an actor's career, however.	More actors and actresses than there are jobs makes this a competitive field. Many actors and actresses cannot obtain year-round work in acting, and must work at other jobs to make a living.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Dancers	Professional dancers perform in classical ballet, modern dance, and musical shows. They may perform on stage, screen, or television. However, relatively few dancers are full-time performers. Many dancers teach in colleges and universities, and at dance schools and studios. Teachers trained in dance therapy work in mental hospitals, nursing homes, and other facilities. Dance teachers are located chiefly in large cities, but many smaller cities have dance schools as well. New York City is the hub for performing dancers.	Talent, in the form of agility, grace, a feeling for music, and the creative ability to express oneself through dance are the most important qualifications. Average body height and build, good feet with normal arches, and a well-formed body with good muscle control are also important. In addition, dancers need a strong desire to become good dancers, determination, physical stamina, and perseverance. Serious training at a dance school or with a private teacher should begin at an early age, particularly for ballet. Training and practice are part of the daily routine and must continue throughout a dancer's career.	More dancers than there are jobs makes this a competitive field. Many dancers cannot obtain year-round work as performers, and must work at other jobs to make a living.
Musicians	Nearly all musicians play in musical groups, including symphony orchestras, dance bands, rock groups, and jazz combos. Popular musicians play in nightclubs, restaurants, and at special concerts and parties. Classical musicians play in symphony, opera, ballet, and theater orchestras, and in chamber music groups. Many pianists accompany soloists or choral groups, or provide background music in restaurants or bars. Most organists play in churches; often they direct the choir. In addition to performing, many musicians teach music in schools and colleges, or give private lessons in their own studios or in pupils' homes. Others combine careers as performers with work as arrangers, composers, or conductors. Musicians who have taken additional training work as music librarians or music therapists.	Musical talent, versatility, creativity, poise, and stage presence are important qualifications for musicians. Self-discipline, perseverance, and physical stamina are also necessary. Training on a musical instrument should begin at an early age. Music lessons can begin at school or with a private teacher. More advanced training can be acquired through further private study with an accomplished musician, in a college or university with a strong music program, or in a music conservatory. Training and practice generally continue through a musician's life, however.	Musicians often work at night and on weekends, and they must spend a great deal of time practicing and rehearsing. Performing engagements usually require some travel. More musicians than there are jobs makes this a competitive field. Many musicians cannot obtain year-round work as musicians and must work at other jobs to make a living.

Performing Arts, Design, and Communications Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Singers	Popular music singers perform in the movies, on the stage, on radio and television, in concerts, and in nightclubs and other places. Other professional singers are members of opera and musical comedy choruses. Outstanding singers may obtain leading or supporting roles in operas, popular music shows, or choral performances such as oratorios. Singing stars make recordings or go on concert tours in the United States and abroad. Some singers combine their work as performers with jobs teaching voice or directing choral groups. They give private voice lessons and direct choruses in schools, music conservatories, colleges, and universities. Many singers work part time as church singers and choirmasters. Opportunities for singing engagements are concentrated mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas, and Chicago—the Nation's chief entertainment centers. Nashville is one of the most important places for employment of country and western singers for both "live" performances and recordings.	Musical ability, an attractive appearance, poise, and stage presence are important qualifications for a career as a singer. Perseverance and physical stamina are also necessary to adapt to frequent traveling and long and irregular working hours. Voice training is an asset for singers of all types of music. As a rule, voice training should not begin until after the individual has matured physically. Training can be obtained through private voice lessons or in a music conservatory or department of music in a college or university. In addition to voice, singers also should study music theory and composition. In general, training and practice continue throughout a singer's career.	Singers usually work at night and on weekends, and most spend considerable time in practice and rehearsal. Performing engagements often require some travel. More singers than there are jobs makes this a competitive field. Many singers cannot obtain year-round work singing and must work at other jobs to make a living.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
DESIGN OCCUPATIONS			
Architects	Most architects work in architectural firms, for builders, for real estate firms, or for other businesses that have large construction programs. Some work for government agencies, often in city and community planning or urban development. Although they work throughout the country, many architects are employed in just seven cities: Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, and Washington, D.C.	Architects must be able both to work independently and to cooperate with others. They should be artistic as well as have a capacity for solving technical problems. A 5-year college program resulting in a Bachelor of Architecture degree is the usual way of entering this profession. All States require architects to be licensed for independent private practice. Unlicensed architectural school graduates work under the supervision of licensed architects. Admission to the licensing exam usually requires a Bachelor of Architecture degree followed by 3 years of experience, or a Master of Architecture degree followed by 2 years of experience.	An architect may have to work overtime and under pressure when necessary to meet deadlines.
Commercial Artists	Most commercial artists work for advertising departments of large companies, advertising agencies, printing and publishing firms, textile companies, photographic studios, television and motion picture studios, and department stores. Others are self-employed or freelance artists. Some salaried artists do freelance work in their spare time. Some artists teach in art schools. Although there are jobs for commercial artists in nearly every city, the majority work in large cities, such as New York, Los Angeles, Boston, Washington, D.C., and Chicago, where the largest users of commercial art are located.	Artistic ability, imagination, neatness, and a capacity to visualize ideas on paper are important qualifications for success in this field. People can prepare for a career in this field by attending a school that offers a program in commercial art. These include trade schools and technical institutes, community and junior colleges, and colleges and universities. Training in commercial art also may be obtained through high school vocational programs and practical experience on the job. Formal training beyond high school usually is needed for advancement, however.	Most commercial artists advance by specializing either in the mechanical elements of producing an ad (letterers and mechanical and layout artists) or in pictorial elements (sketch artists and illustrators).

Performing Arts, Design, and Communications Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Display Workers	Most display workers work for large stores: Department stores, clothing stores, home furnishing stores, variety stores, drugstores, shoe stores, book stores, and gift shops. Freelance or self-employed display workers have accounts with small stores that need professional window dressing but cannot afford a full-time display worker.	Display workers need imagination and knowledge of color harmony, composition, and other fundamentals of art. Most display workers are trained on the job. A beginner can usually become skilled in 1 to 2 years. Employers usually require a high school diploma.	Constructing and installing props means standing, bending, stooping, and working in awkward positions. During busy seasons, such as Christmas and Easter, display workers may have to work overtime, nights, and weekends to prepare special displays.
Floral Designers	Nearly all floral designers work in retail flower shops, and these are found almost everywhere in large cities, suburban shopping centers, and small towns.	Manual dexterity and a good sense of color, balance and proportion are important qualifications for floral design. Many floral designers are trained on the job by the manager or an experienced floral designer. Usually a trainee can become a fully qualified floral designer after 2 years of on-the-job training. Courses in floral design offered by community colleges and floral design schools also prepare people for careers in this field.	Most retail flower shops are small and employ only one or two floral designers; many designers manage their own stores. In small shops, floral designers often work 8 hours a day, Monday through Saturday. Designers generally work long hours around certain holidays, such as Easter and Valentine's Day, when the demand for flowers is great.
Industrial Designers	Most industrial designers work for large manufacturing firms or for design consulting firms. Some do freelance work or are on the staffs of architectural and interior design firms. The jobs of all these designers have one thing in common: They design products for consumer or industrial use. Some industrial designers teach in colleges, universities, and art schools. Industrial design consultants work mainly in large cities such as New York, Chicago, Los Angeles, and San Francisco. Industrial designers with industrial firms usually work in or near the manufacturing plants of their companies, which often are located in small and medium-sized cities.	Industrial designers need creative talent, drawing skills, and the ability to see familiar objects in new ways. They should be able to work and communicate well with others. To become an industrial designer, it's usually necessary to complete a 4-or-5 year program in industrial design. Such programs are offered by art schools and by the design or art departments of colleges and universities. Persons with degrees in engineering, architecture, and fine arts may qualify as industrial designers if they have appropriate experience and artistic talent.	Although most industrial designers are product designers, others develop trademarks or symbols that appear on products, advertising, stationery, and brochures. Some design containers and packages, while others design display exhibits. Industrial designers use both sketches and 3-dimensional models to convey their ideas.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Interior Designers	Most interior designers work for design firms or have their own firms. Some work in department or furniture stores, or for hotel and restaurant chains. Other designers work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, or other manufacturers in the interior furnishings field. Interior designers also have jobs with magazines that feature articles on home furnishings. Interior designers are employed primarily in large cities.	Interior designers should be creative, have good color sense and good taste, and be able to work well with people. Training in interior design is becoming more and more important. The types of training available include 3-year programs in a professional school of interior design, 4-year college or university programs that grant a bachelor's degree, or post-graduate programs leading to a master's degree or Ph. D. People starting in interior design usually serve a training period with a design firm, department store, or furniture store.	Interior designers' work hours are sometimes long and irregular. Designers usually adjust their workday to suit the needs of their clients, meeting with them during the evenings or on weekends when necessary. Some interior designers are paid straight salaries, some receive salaries plus commissions based on the value of their sales, and others work entirely on commissions.
Landscape Architects	Most landscape architects are self-employed or work for architectural, landscape architectural, or engineering firms. Government agencies concerned with land management, forests, water, housing, planning, highways, and parks and recreation also employ landscape architects. Some landscape architects work for landscape contractors and others teach in colleges and universities.	Drawing talent, a creative imagination, and an appreciation for nature are important qualifications for landscape architects. A bachelor's degree in landscape architecture takes 4 or 5 years. This degree is usually needed to enter the profession. Thirty-eight states require a license for independent practice of landscape architecture. Admission to the licensing examination usually requires 2 to 4 years of experience in addition to a degree in landscape architecture.	Some landscape architects specialize in certain types of projects such as parks and playgrounds, hotels and resorts, shopping centers, or public housing. Others specialize in services and resource management, feasibility and cost studies, or site construction.

Performing Arts, Design, and Communications Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Photographers	Most photographers work in commercial studios; many others work for newspapers and magazines. Government agencies, photographic equipment suppliers and dealers, and industrial firms also employ photographers. In addition, some photographers teach in colleges and universities, or make films. Still others work freelance, taking pictures to sell to advertising agencies, magazines, and other customers.	Photographers need good eyesight and color vision, artistic ability, and manual dexterity. They also should be patient and accurate and enjoy working with detail. There are no set requirements for becoming a photographer. However, the training a prospective photographer has determines the type of work for which he or she qualifies. People may prepare for work as photographers in a commercial studio through 2 or 3 years of on-the-job training as a photographer's assistant. Training in photography can also be acquired in colleges and art schools. Post-high school education and training usually are needed for industrial, medical, or scientific photography, where it is necessary to have some knowledge of the field in which the photography is used.	Many photographers specialize in a particular type of photography, such as portrait, commercial, newspaper, industrial or medical photography. About one-third of all photographers are self-employed.
Planners	Planners prepare programs for the future development of communities. They take into account population trends, land use, public facilities, economic factors, and civic goals. Most planners work for city, county, or regional planning agencies. Some work for government agencies that deal with housing, transportation, or environmental protection. Others work for architectual, engineering, or construction companies. Planners also work for public interest organizations concerned with environmental protection and community development. Many planners do consulting work, either part time in addition to a regular job or as employees or owners of consulting firms.	Planners need analytical and abstract reasoning abilities above all. They need to be creative and resourceful in developing possible solutions to complex problems, and must have drive, tact, and persuasive and administrative skills in order to get their ideas across. A master's degree in urban or regional planning is usually required for a job in this field. However, people with bachelor's degrees in city planning, architecture, or engineering also qualify. Most graduate programs in urban planning require 2 or 3 years of study in addition to the 4-year undergraduate college degree. Graduate students gain practical experience through workshops, laboratories, and summer or part-time employment in a planning office.	In large organizations, planners specialize in areas such as housing or economics, while in small offices they must work in several different areas.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
COMMUNICATIONS OCCUPATIONS			
Advertising Workers	There are both creative and sales jobs in advertising. Creative workers such as writers, artists, and designers develop and produce advertisements, while business and salesworkers handle the arrangements for broadcasting advertisements on radio and TV, publishing them in magazines or newspapers, mailing them directly, or posting them on billboards. Advertising workers are employed by different kinds of firms. Primarily, they work for advertising agencies. But they also work in the advertising departments of manufacturing firms, retail stores, and banks. Some work for printers, art studios, letter shops, and similar businesses. Most of those employed by advertising agencies work in New York City, Chicago, or Los Angeles.	Advertising copywriters must have a flair for writing, imagination, salesmanship, and an understanding of people. A sense of the dramatic and the vision to see the effect of ideas are also important qualities. Account executives, whose job it is to create ad campaigns for clients, need writing skills and imagination too. In addition, they must be friendly, outgoing, and very good at communicating with others and selling their ideas. Most employers prefer to hire college graduates. A liberal arts degree usually provides good preparation for a job in this field, but work experience and creativity may be more important than educational background. Experience selling ads for school publications or radio stations can be a help in looking for a job.	Among the jobs in this field are those of advertising manager, account executive, research director, advertising copywriter, artist, layout worker, media director, and production manager. People in advertising work under great pressure to do the best job in the shortest period of time. Often they work long or odd hours to meet deadlines.
Interpreters	The largest concentration of full-time interpreters in the United States is at the United Nations in New York. Other international organizations that employ regular staff interpreters include the Organization of American States, the International Monetary Fund, the Pan American Health Organization, and the World Bank. All are situated in Washington, D.C. There also are jobs for freelance interpreters, many of whom serve as escort interpreters for foreign visitors to the United States. Other freelance interpreters work at international conferences, or work for business firms.	People interested in becoming interpreters should be articulate speakers and have good hearing. The exacting nature of this profession requires quickness, alertness, and a constant attention to accuracy. Good sense, honesty, tact, and discretion are also important. A university education usually is essential. A complete command of at least 2 languages generally is required. Interpreters who work at the United Nations must know at least 3 of the 6 official U.N. languages.	Interpreters make up a very small occupational group in the United States, and competition for interpreting jobs is great.

Performing Arts, Design, and Communications Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Newspaper Reporters	Reporters work for big city daily newspapers, for suburban community or small town weekly papers, and for press services. Reporters work in cities and towns of all sizes.	Important personal characteristics for newspaper reporters include curiosity, persistence, a "nose for news," initiative, resourcefulness, an accurate memory, and physical stamina. Most newspapers consider only applicants who have a college education, preferably with a degree in journalism or some other liberal arts area. Graduate work is increasingly important.	Although the majority of newspapers are in medium-sized towns, most reporters work in cities, since big city dailies employ many reporters whereas a small town paper generally employs only a few. Newspaper reporters generally have a busy daily schedule and may often have to work under pressure to meet deadlines.
Public Relations Workers	Public relations workers plan activities and create programs to promote a favorable public image of their client. Writing is an important aspect of the work. They write and edit articles, speeches, reports, pamphlets, and press releases. Public relations workers have jobs with business and industrial firms, insurance companies, transportation companies, public utilities, hospitals, colleges and universities, nonprofit organizations, and government agencies. Many work for public relations firms, which are most numerous in New York City, Los Angeles, Chicago, and Washington, D.C.	Public relations workers need writing ability, imagination, an outgoing personality, initiative, and drive. They must be fluent in conversation, effective public speakers, and persuasive. They should have the enthusiasm to motivate others. A college education with public relations experience is excellent preparation. Appropriate majors include public relations, journalism, liberal arts, and business. Experience writing for a school publication or for a radio or TV station can be helpful.	Public relations workers often have to work overtime on a project. Occasionally they travel on business.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Radio and Television Announcers	Radio and television broadcasting stations all over the country employ announcers. The average commercial radio or television station employs 4 to 6 announcers, although larger stations employ 10 or more. In addition to staff announcers, several thousand freelance announcers sell their services for individual assignments to networks and stations, or to advertising agencies and other independent producers.	Announcers must have a pleasant and well-controlled voice, a good sense of timing, correct English usage, and excellent pronunciation as well as an attractive personality. There are no fixed requirements for entering this field. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses in the broadcasting field. A number of private broadcasting schools offer training in announcing also.	Most radio announcer act as disc jockeys. Announcers employed by television stations and large radio stations usually specialize in particular kinds of announcing, such as sports, news, or weather. Announcers frequently participate in community activities.
Technical Writers	Many technical writers work for electronics, aviation, aerospace, ordnance, chemical, pharmaceutical, and computer firms. Others work for energy or communications firms. Research laboratories also employ technical writers. Some technical writers hold writing and editing jobs with business and trade publications, professional journals in engineering, medicine, physics, chemistry, and other sciences; and publishers of textbooks and scientific and technical literature. Established technical writers sometimes work on a freelance basis or open their own agencies or consulting firms.	Technical writers need writing skills and technical expertise above all. They also should be intellectually curious and able to think logically. They must be accurate in their work. They should be able to work well with others as part of a team. A college degree is important, and should include courses in a technical area such as science, engineering, medicine, business, or agriculture as well as writing, editing, and publication production.	Technical writers sometimes work under considerable pressure, working overtime to meet publication deadlines. Employers often promote technicians or research assistants to writing and editing jobs. Technical writers have a place in the information industry. Commercial firms employ technical information specialists to collect, process, and manage the information stored in computerized data bases. Technical information centers run by major industrial firms and research laboratories employ information specialists for the same purpose.

Newspaper reporters must be able to work under pressure.

Exploring Careers

Answers to Related Occupations

ARCHITECT

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STREET MUSICIAN

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Answers to math problems

ARCHITECT

2000 sq ft.; 4 ft. x 5 ft. x 10 ft., 5 ft. x 5 ft. x 8 ft., 10 ft. x 10 ft. x 2 ft.; $15,000.

Exploring Careers

Agriculture, Forestry, and Fishery Occupations

Soil research helps farmers grow better crops.

"Sue, would you drive me downtown today?" Larry Cohen asked his older sister. "I've got to do some shopping. Tryouts for the basketball team start tomorrow, and I need some new gym shoes."

Sue, who was taking a day off from her job as nutritionist in a local hospital, couldn't think of an excuse for not taking Larry. So they went downtown to buy Larry some shoes.

After they finished shopping, Sue and Larry decided to stop in a fast-food store and grab a bite to eat. Once they had gotten their food and sat down at a table, Sue noticed that Larry was staring into space with a worried look on his face.

"What's bothering you, Larry?" Sue asked. "Are you that worried about making the team?"

"I wish it was that simple," answered Larry. "I have to give a report tomorrow on the kinds of jobs in agriculture, and I don't know where to start."

Sue thought for a minute and then said, "How about starting with what's in your right hand?"

"Do you mean this fish sandwich?" Larry asked in an unbelieving tone.

"Sure," Sue replied. "Did you ever stop to think about how many different ingredients there are in that sandwich and where they all came from?"

"No, but it doesn't seem that complicated," Larry answered. "Let's see, the roll came from a bakery, the fish came from the ocean, and the sauce . . ."

"Very cute, Larry," snapped Sue. "I'm sure you'll make an A with such a comprehensive report. Now, do you want me to help you or not?"

"Sure I do," Larry answered contritely. "I just don't see what my fish sandwich has to do with agriculture."

"Take the bun, for example," responded Sue. "The wheat for the flour in it probably came from a grain farm in the Midwest. And quite possibly that particular variety of wheat was developed by an agricultural scientist. Can you think of any other ingredients in the roll?"

"I'm not sure," Larry replied. "Does the roll have milk or sugar in it?"

"Yes, dried milk and probably corn syrup also," replied Sue. "The milk may be from a dairy farm in Wisconsin, which is one of the big dairy States, and the corn syrup, from Iowa. Probably many more agricultural products are in the roll, but I'll leave them for you to investigate later. You might start by reading the ingredients listed on the wrapping of a loaf of bread. Now, to keep this conversation rolling, could you tell me where the fish in your sandwich came from?"

"I guess somebody caught it in the ocean," Larry replied, "but I'm not sure."

"You're probably right, Larry," answered Sue. "If the fish is a hake, haddock, or pollack, then it was probably caught by a fisher in the North Atlantic. But if it is catfish, it probably was raised on a fish farm."

"A fish farm?" asked Larry. "Now I think you're putting me on."

"No, aquaculture, or fish farming, is a rapidly growing area of agriculture that is still far from reaching its full potential," said Sue. "If you think I'm just telling you a fish story, then check it out in your school library."

"I think I will," said Larry. "That sounds like it might make a good topic for my report."

"Good," said Sue with a smile. "Now, can you tell me where that napkin you're wiping your face with came from?"

"Sure, that's easy," answered Larry with a grin. "It came from a napkin farm."

"Believe it or not, you're almost right," said Sue. "Most paper products come from pulp made from trees. And many trees come from tree farms. Now can you see what your fish sandwich has to do with agriculture?"

"Yes," said Larry, "the sandwich and everything in it are products of agriculture and the many different types of agricultural workers. I just didn't realize that a fish sandwich could be so complex."

"Good thinking, Larry," said Sue, "but remember that we've just scratched the surface of the wide variety and complexity found in modern agriculture. I think, however, that you've made a good start now on thinking about your report."

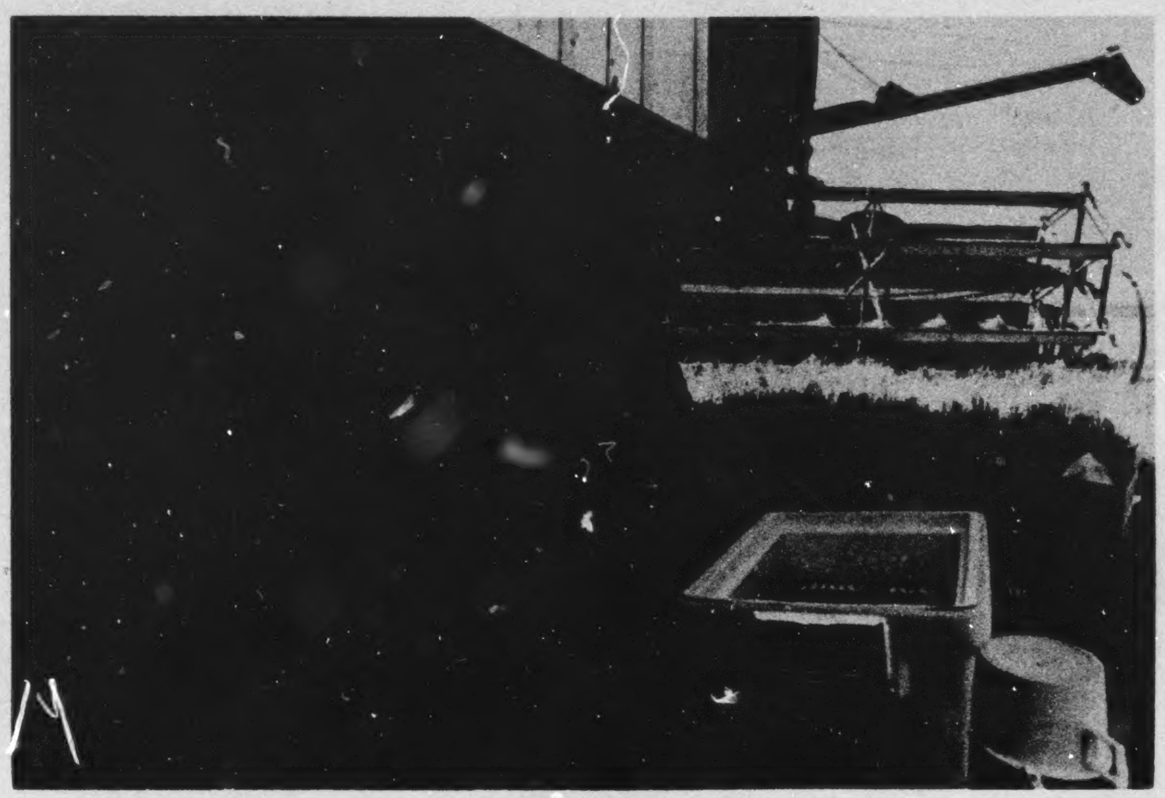
Workers in agriculture, forestry, and fishery produce many of the products we use every day. The following sections will tell you about their jobs.

Agricultural Production Occupations

First, of course, there are the workers who are engaged directly in agricultural production. This broad group includes producers of plant products, such as corn, wheat, and vegetables, and producers of animals, such as chickens, cattle, and sheep. Most *farmers* and *ranchers*, however, now specialize in particular varieties of crops and animals. As a result, specialized types of workers are now needed for these various types of farm products. Many of these specialized workers are discussed in the following sections on occupations in *plant farming* and *animal farming*.

Accompanying this trend toward crop specialization is a trend toward larger sized farms—farms that are often too big for one person, or even one family, to take care of alone. Because of this, there are many opportunities for *farm laborers* and *farm labor supervisors* to help run the farms. These occupations also provide opportunities

Agriculture, Forestry, and Fishery Occupations



Harvesting wheat can be hot work. A patch of shade and some lunch provide a welcome break.

for workers who want to farm but who don't yet have enough money to buy the necessary land and equipment.

Many large corporations, and some wealthy individuals also, are engaged in what is now called agribusiness. A corporation, for example, may hold large amounts of land on which grain is grown to be fed to cattle kept in pens or feedlots also owned by the corporation. Farm operations of this size are very complex and create jobs for *farm managers.*

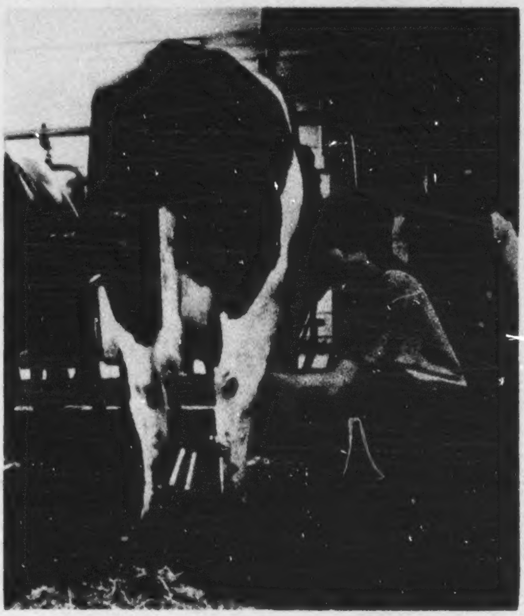
Let's take a closer look at the types of workers needed in agriculture.

Plant Farming Occupations. Most farmers and farm workers are employed in plant farming.

The grain farming occupations include *cash grain farmers,* who are responsible for raising the various grains we use for food. Often these farmers' job titles refer to the specific type of grain they grow, such as *corn grower, rice farmer, soybean grower,* and *wheat grower.* Cash grain farmers cannot handle all the different jobs associated with raising large quantities of grain by themselves. *Grain farm workers* operate the farm machinery used in planting and harvesting grain and perform other duties, such as checking irrigation ditches and carrying supplies. *Farm labor supervisors* direct the activities of farm workers. *Detasseling crew supervisors,* for example, direct the activities of workers who break and pull tassels from corn plants on hybrid seed-corn farms.

Other workers grow and harvest vegetable crops. *Vegetable farmers'* job titles often refer to the vegetable they specialize in growing, such as *onion farmer* or *lettuce grower.* Farmers who grow a variety of different vegetables are sometimes called *truck farmers. Vegetable farm workers* do much of the labor required in raising and harvesting vegetables. Some farm workers called *vegetable harvest workers* pick, bunch, and wash vegetables. Supervisors oversee the vegetable farm workers.

Fruit and nut farming also requires workers with specialized skills. Farmers in this field usually are named by the type of crop they grow, such as *apple grower,*



Dairy cows have to be milked morning and night, 365 days a year.

Making maple syrup is a way of life for this farm family in Vermont.

Texas cantaloupes are shipped throughout the world.

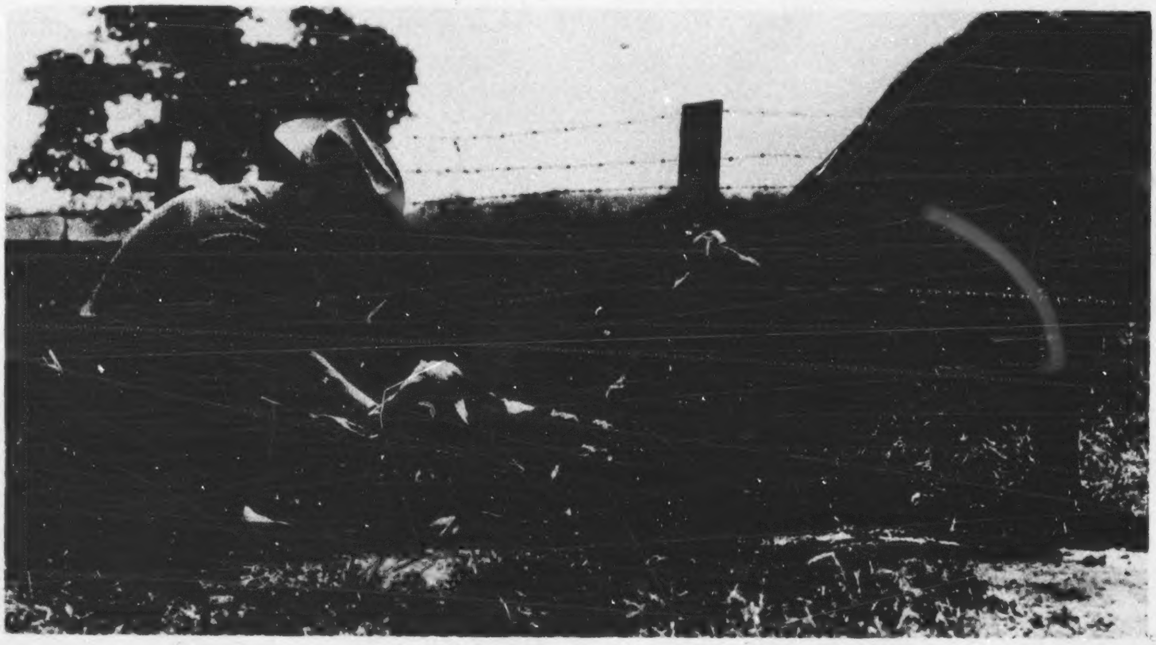
cherry grower, orange grower, pecan grower, grape grower, blueberry grower, and *strawberry grower.* In addition to laborers and supervisors, this kind of plant raising requires some highly specialized workers. *Fig caprifiers,* for example, attach figs containing wasps to fig trees in order to help ensure pollination. *Vine pruners* cut back berry vines so they will produce more fruit.

Field crops, such as cotton, peanuts, potatoes, sugar beets, sugarcane, and tobacco, also require specialized workers. *Seed-potato arrangers and cutters,* for example, are needed to attend the machines that cut potatoes into sections for use as seed. *Field crop supervisors,* farmers, and other types of farm laborers are also needed. *Shed worker supervisors,* another type of specialized worker, direct the activities of the workers who cure tobacco leaves in sheds on farms.

Animal Farming Occupations. The largest group of occupations in animal farming are the domestic animal farming occupations. Among these are livestock ranchers, such as *cattle ranchers, dairy farmers,* and *sheep farmers,* who breed and raise livestock for sale. *Livestock farm workers,* or *ranch hands* as they are more commonly called, assist ranchers by performing a wide variety of chores around the ranch, such as feeding and vaccinating animals and repairing fences. Many types of animal farming require specialized workers. *Top screws,* or *ramrods,* for example, supervise and coordinate the activities of *cowpunchers* in cattle ranching. *Lambers* assist ewes during lambing, while *sheep-shearers* clip the wool from live sheep in sheep ranching. *Fur farmers* breed and raise animals such as mink, fox, or chinchilla, and are assisted by *pelters* who skin the animals for their fur.

Poultry farming also requires many different types of workers. *Poultry farmers,* for example, raise improved strains of poultry developed by *poultry breeders* to produce eggs and meat. Many other specialized workers assist in poultry farming. *Poultry tenders* care for poultry used in experimental tests to develop better feeding systems. *Poultry farm workers* do many of the day-to-day jobs involved in poultry raising. *Poultry vaccinators* vaccinate poultry against diseases such as pox and bronchitis. *Chicken graders* grade baby chicks according to appearance and separate healthy from deformed or diseased chicks. *Chicken sexers* determine the sex of young chickens and separate them by sex.

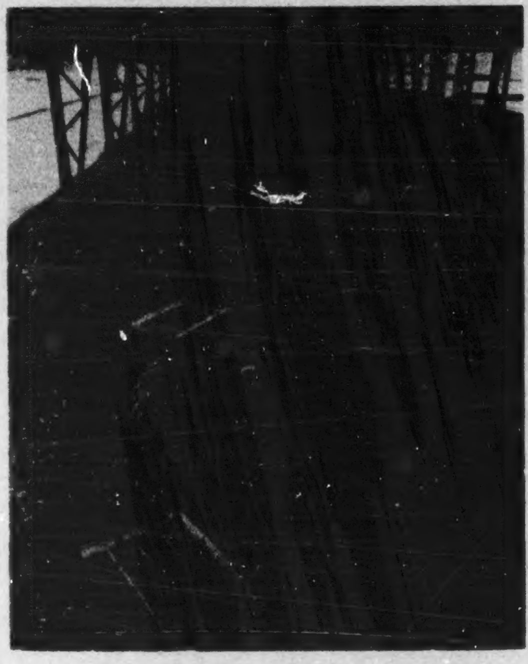
Game animals, such as deer, pheasant, and quail, also are raised under controlled conditions. *Game farm supervisors* oversee and plan the activities of workers involved in breeding, raising, and protecting game on private or State game farms. *Game farm helpers* do most of the physical work associated with game farming. And *game-*



Assisting with the birth of a calf is part of a rancher's job.

bird farmers raise birds such as pheasant, quail, or partridge for sale to gun clubs, game preserves, or poultry houses.

Mammals and birds are not the only types of animals raised commercially. *Beekeepers* raise bees to produce honey and pollinate crops. *Reptile farmers* breed and raise reptiles such as rattlesnakes for their meat, venom, and skins. *Worm growers* assisted by *worm farm laborers* breed and raise earthworms for sale as fishing bait, garden soil conditioners, and food for exotic fish and animals.



Modern poultry farms have automatic feeding and watering systems.

Science has made significant contributions to modern agriculture.

Agricultural Support Occupations

Modern agriculture is a complex undertaking that requires many thousands of workers who are not directly involved in agricultural production. These workers are needed to help support agriculture in a number of areas, such as agricultural business, education, food processing, and science. Now let's take a quick look at some of these occupations.

Most types of farming, for example, require the use of large amounts of machinery, equipment, and other farm supplies, such as chemicals and pesticides. As a result, there are many jobs for workers who sell, maintain, and explain how to use machinery and supplies. *Farm equipment sales workers* are needed to sell the tractors, combines, plows, planters, and other farm equipment used in agriculture. These workers also help farmers choose the equipment that best suits their particular farming needs. *Farm equipment mechanics* maintain and repair tractors and a wide variety of other farm equipment.

Agricultural engineers help improve efficiency in agriculture by designing new types of farm equipment or improving existing model lines. *Agricultural chemical sales workers* sell and explain the use of the different types of pesticides, herbicides, and fertilizers that have greatly increased agricultural production in this country. *Agricultural pilots* spray chemicals on crops from airplanes and helicopters.

Workers in agricultural production also need considerable assistance with the financial and technical aspects of farming. *Bankers* in rural areas, for example, help support agriculture by providing loans for farmers to buy land, equipment, and other supplies needed in raising crops. *Agricultural economists* deal with problems related to production, financing, pricing, and marketing of farm products. *Agricultural cooperative extension service workers* provide information on agricultural research to farmers and encourage its use to increase the amount of agricultural products that farms can produce. *Veterinarians* provide valuable technical assistance to livestock producers by keeping animals healthy and productive. Farmers also, of course, need markets for their farm products once they are harvested. *Buyers and shippers* help fill this role. Keeping accurate financial records is also an important part of agriculture. *Agricultural accountants* prepare and analyze financial reports for farm managers. *Agricultural commodity graders*, such as grain inspectors, also help support agriculture by assuring that farm products are of uniform quality and fit for consumption.

Science has made significant contributions to modern farming and is expected to produce even greater benefits in the years ahead. As a result, there are many jobs for scientists and other professionals who concentrate on agriculture. *Agronomists*, for example, conduct experiments and develop better methods of growing crops. *Plant pathologists* study the causes of plant diseases and develop ways to control weeds, insects, and plant diseases. *Plant physiologists* study the structure of plants and devise ways to improve their growth and storage life. *Geneticists* try to develop breeds of plants and animals that are better suited for the production of food and fiber. *Microbiologists* study bacteria and other tiny organisms to understand better their relation to human, plant, and animal health. *Animal physiologists* study the functions of the various parts of animals. *Animal scientists* develop improved methods of housing, sanitation, and parasite and disease control for livestock. *Animal nutritionists* specialize in finding feed requirements that will maximize production and in developing new livestock and poultry feeds. *Entomologists* study insects to try to find ways to control harmful insects and manage beneficial ones. *Seed analysts* conduct tests on samples of seeds to determine their rate of germination, purity, and weed content. *Agricultural chemists* develop chemical compounds for controlling insects, weeds, fungi, and rodents. They also perform experiments to determine how to use fertilizers properly and investigate problems of nitrogen fixation in soils. *Food scientists* develop new foods, food preservatives, and similar products. *Soil scientists* and *soil conservationists* study ways to improve the use of soils upon which agriculture is based.

Becoming a farmer can be very expensive. This tractor, for example, costs over $50,000.

Exploring Careers

Forestry Occupations

Forests are a vital natural resource that can be used repeatedly if they are properly managed. They provide habitats for conserving our wildlife as well as recreational facilities for ourselves. Forests also provide the raw materials for lumber and paper. Workers in the forestry occupations are concerned with the management and proper utilization of our forests.

Foresters, who often specialize in one area of work, such as timber management or outdoor recreation, are key workers in this field. Foresters plan and supervise the cutting and planting of trees and also protect the trees from fire, harmful insects, and disease. They may be responsible for other duties ranging from wildlife protection and watershed management to the development and supervision of camps, parks, and grazing lands. *Forestry technicians* assist foresters in many of their tasks, such as mapmaking, selecting and marking timber to be harvested, and planting seedlings.

Fires are one of the major dangers facing our forest resources. Thus *fire lookouts* and *fire rangers* are stationed in remote areas to spot and then put out or report forest fires. If a fire is reported in an inaccessible area, then *smoke jumpers,* under the direction of *smoke jumper*

Scientists and technicians help assure a plentiful supply of clean water for fish and wildlife.

A skilled logger can drop a tree exactly where he wants it.

Some college students work during summer vacation as fire fighters for the U.S. Forest Service.

supervisors, parachute into the area and put out the fire. *Forest-fire fighters*, sometimes called *smoke eaters*, also help control forest fires.

Harvesting forest products, or logging, is an important part of managing our forest resources. Before a stand of timber is cut, foresters, with the assistance of *forestry aides* and *timber cruisers*, decide what trees should be harvested and estimate the amount of wood in these trees. *Heavy equipment operators* then build access roads and trails to the cutting and loading areas.

Fallers, working singly or in pairs, then cut down the large trees marked by the forester. Expert fallers can usually drop a tree in the exact spot where they want it, without injuring nearby trees. Once the tree is down, *buckers* saw the limbs off and saw the trunk into logs. Sometimes small trees are felled with tree harvesters, machines mounted on a tractor and operated by *logging-tractor operators*.

Next, the logs must be removed from the cutting area. One method is called skidding. In this method, a choker (steel cable) is noosed around the log by *choker setters* and then attached to a tractor which drags or skids the log to the landing. A *rigging slinger* supervises and assists choker setters and tractor drivers.

After the logs reach the landing, they are loaded on a truck trailer and hauled to the mill. A *loader engineer* operates a machine that picks up logs and places them on the trailer. A *second loader* directs the positioning of logs on the trailer.

Forest nursery supervisors oversee and coordinate the activities of workers who raise tree seedlings for reforestation. Some of these workers are *seedling sorters*, who sort seedlings according to size and quality, and *seedling pullers*, who harvest tree seedlings in forest nurseries.

Millions of hardy seedlings are grown on tree farm nurseries. They get a good start at the nursery, then are transplanted.

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Exploring Careers

Fishery Occupations

Fish provide an important source of protein for both humans and animals around the world. There are two major ways of obtaining fish. The oldest is simply to harvest the fish that are found in our oceans, rivers, and lakes. In recent years, however, another method, called aquaculture, or fish farming, has been growing in importance. Let's take a look at some of the workers in these two broad areas of fishery.

Fishers harvest aquatic animal life from our oceans, rivers, and lakes in a number of ways, depending on the location and the type of fish being sought. *Net fishers,* for example, catch finfish, shellfish, and other marine life using seines, trawl nets, gill nets, and a wide variety of other types of nets. These workers are often named according to the type of net they use, such as *dip net fisher, beach seine fisher,* or *purse seine fisher. Pot fishers* use pots (cages with funnel-shaped openings) to harvest marine life including crabs, eels, or lobsters. These fishers

These workers are checking salmon to see if they are ready to lay their eggs.

Fishing is one of the oldest ways of getting food.

Some oysters are raised for pearls.

Fish farming, or aquaculture, is a rapidly growing area of agriculture. These workers are harvesting catfish.

also may use dredges (rake scoops with bag attached) during certain times of the year. Pot fishers are usually named according to the type of marine life they fish for, such as *crab fishers, eel fishers,* or *lobster fishers. Line fishers* catch fish using hooks and lines. *Hand line fishers* simply use a line they hold in their hand, while *trawl line fishers* may use long lines that extend for over a mile with thousands of hooks hung at intervals on the line. *Diving fishers* gather marine life such as sponges, abalones, and pearl oysters from the sea bottom. *Fishing vessel deckhands* do a wide variety of jobs that assist fishers aboard ship. *Net repairers* assemble and repair nets on shore and aboard ship.

Aquaculture, or fish farming, is a rapidly growing field that offers many employment opportunities. *Fish farmers,* such as *trout farmers* or *catfish farmers,* spawn and raise fish for sale to supermarkets and other commercial interests. *Fish hatchery workers,* under the direction of *fish hatchery supervisors,* trap and spawn fish, incubate fish eggs, and rear young fish in hatcheries. Some of these fish, such as trout, are then stocked in streams to be caught by sport fishers, while others are used for commercial purposes. Shellfish, such as oysters, clams, and scallops, can also be raised commercially. *Shellfish-bed workers,* under the direction of *shellfish farming suprvisors,* plant, cultivate, and harvest these various types of shellfish. These workers are usually named according to the types of shellfish they work with and the type of duties they perform, such as *clam-bed worker, oyster unloader, scallop dredger, oyster picker,* or *clam digger. Aquatic life laborers* perform a number of routine tasks involved in raising marine life. *Shrimp pond laborers* may, for example, patrol shrimp ponds looking for predators. They also may help in feeding and harvesting fish or in preparing shellfish beds.

Fishery also offers numerous opportunities for professional workers. *Fishery biologists,* for example, collect and analyze data on the physiology of fish, transplanting methods, fish raising techniques, and management of fish and shellfish stocks.

Personal Characteristics

The basis for the work done by people in each of these fields lies in nature. Agriculture, forestry, and fishery would not be possible were it not for the sun and the clouds, the soil and the seas, rivers and lakes, and forests and fields. It is not surprising, therefore, that successful workers in these fields have been actively interested since childhood in hunting and fishing or in observing birds, insects, wildlife, trees, and flowers. They have a strong *interest in nature* and the environment around them.

Not surprisingly, people in many of these occupations *enjoy working outdoors.* Working outdoors, however, can often be physically demanding; these workers are exposed to all types of weather conditions and often must lift heavy objects or perform hard physical labor for extended periods. Forestry workers, for example, may have to hike many miles to reach fires or when "cruising" timber stands. As a result, *physical strength* and *stamina* are assets.

Agriculture, forestry, and fishery have become highly mechanized and machines do much of the work that used to be done by hand: Planting and harvesting crops, hauling in fishing nets, and harvesting trees. But these machines must be maintained and repaired. A belt may snap on a farmer's combine during the critical harvest time, for example. Or a winch used for hauling in nets may break down while a fisher is far out at sea. If the farmer and fisher can't fix these problems by themselves, they may experience costly delays. Because of this, *mechanical ability* and the *ability to work with your hands* are extremely important.

Carrying 50-pound sacks of feed is hard work.

Work schedules in agriculture often are set by elements beyond human control. A farmer, for example, may have only a few days when conditions are just right for planting or harvesting crops. If the farmer is not fully prepared when this time arrives, there will simply be no crop and thus no farm income that growing season. Consequently, being *well organized* is essential.

Agriculture, forestry, and fishery workers often must choose the best way to spend their time and money from among a wide variety of options. A forester, for example, may be given a limited budget for managing a section of woodland and must decide how best to use the money. Should part of the money be spent on firefighting equipment or on fertilizer, for example? Workers in these fields must be *able to set priorities.*

Many people in agriculture, forestry, and fishery are their own bosses or work with little or no supervision. This takes *initiative* or the *ability to be a self-starter.*

Crops, animals, trees, and other agricultural products do not grow overnight. Some years you may see little or no income or other visible results for your work. Because of this, *patience* and the ability to withstand bad years and save during good years are important qualities.

Much of the work in agriculture, forestry, and fishery is based on the ability to apply science on the job. Do you have a strong *interest in science?* Are you curious about life and living things? Are you a good observer? Do you examine things critically and analyze what you have seen? These traits are essential for such workers as fishery biologists, plant breeders, poultry scientists, and botanists who must understand science and use it in their work.

Many agriculture, forestry, and fishery occupations involve *working with people.* Frequent, if not daily, exchanges with other people are an important part of the job for cooperative extension service workers, feed sales workers, and farm credit managers, among others.

Finally, a *sense of responsibility* is very important for workers in agriculture, forestry, and fishery. You should care not only for this season's crops or animals, but also for the long-range protection and improvement of the environment. If you don't, then surely you are not meeting your responsibilities toward future generations.

Training

Training requirements vary widely. Farm laborers, fishers, and smoke jumpers, on the one hand, may find jobs without finishing high school; they learn on the job. On the other hand, cooperative extension service workers, fish biologists, and many others need college degrees in agriculture or a science. The training requirements for 18 selected occupations are listed in the Job Facts section at the end of this chapter.

Since there is a wide variety of training paths for such a broad field as the agriculture, forestry, and fishery occupations, no one path is the best for all of them. There are, however, some things you can do now to explore your interest.

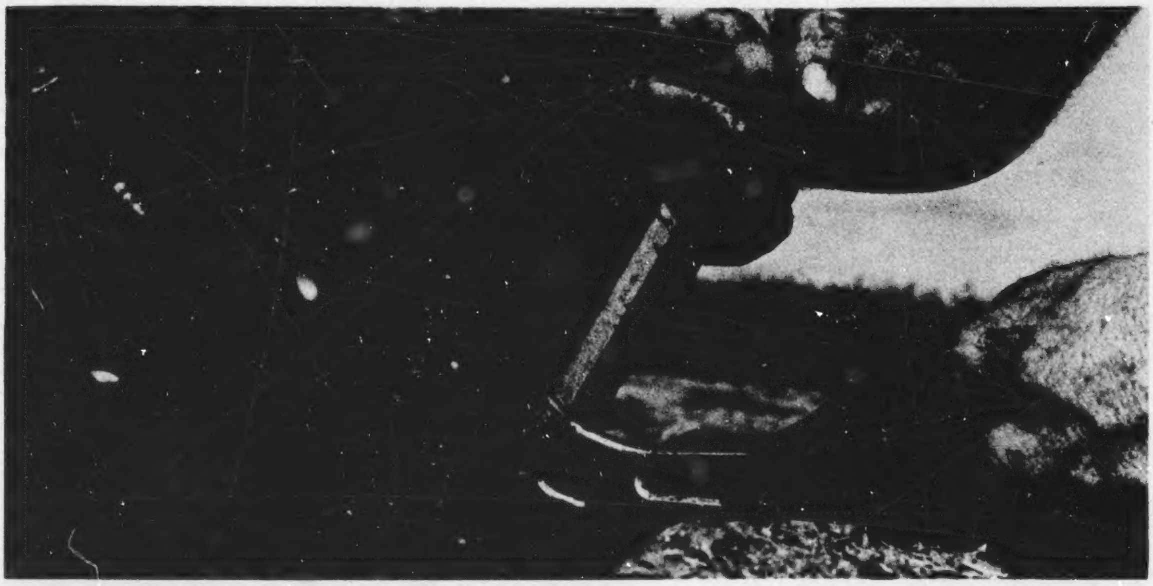
Science is very important in many of these occupations. High school courses in biology, chemistry, physics, and mathematics provide the foundation you'll need for the science courses you'll take later on. Science fairs give you the opportunity to do projects in agriculture, forestry, and fishery. High school courses in vocational agriculture, although not essential, are useful for testing your interests and seeing if you have the skills needed by workers in agricultural production.

As a general rule, growing up on a farm or having some agriculture background or experience is helpful. One reason for this is that the day-to-day tasks involved in many of these occupations are best learned through experience. In addition, working at a job is one of the best ways to find out if you like the work and are able to meet the demands of the job. Even if you do not live on a farm, you can gain useful experience by working part time or summers on a farm or for a summer camp.

You also might participate in farming programs for young people, such as the Future Farmers of America or the 4-H Clubs. These organizations are important sources of training for young farmers and provide practical experience in agriculture along with awards and other forms of recognition. Members also are active in fairs, agricultural contests, horse shows, and a wide variety of other activities.

Farm experience, however, is not essential for many of the scientific, technical, and business careers in agriculture, forestry, and fishery. In fact, many of the students enrolled in State schools of agriculture are from urban areas. Even if you live in a city, however, you should learn as much about the environment and the natural world as you possibly can. Taking nature walks and observing wildlife, trees, and flowers as well as hunting and fishing are activities you might consider.

The Boy Scouts, Girl Scouts, Campfire Girls, and similar organizations offer good opportunities for getting outdoors and learning about your environment. Youth organizations offer numerous programs and proficiency badges that are directly related to the fields of agriculture, forestry, and fishery.



Farmers need to know how to repair machinery.

Exploring Careers

Farmer

John O'Quinn samples the crop. "The harvest is the best part of farming," he explains, "because it's everything you've been working for."

Agriculture, Forestry, and Fishery Occupations

The sun had not yet risen over the Eastern Shore of Maryland when John O'Quinn climbed into his pickup truck to drive to his farm for another day's work. Getting up before dawn was nothing new to John, though; he had worked on the farm since he was a very young boy. Even while he was studying agriculture at the University of Maryland, he had come home almost every weekend to help his father run the family's 500-acre farming operation. Then, about 2 years ago, his father had retired, and John, along with his sister Alice, had taken over the operation of the farm.

As he was driving to the farm, John felt a sense of excitement because today was a very special day, the beginning of the watermelon harvest. Work had begun on preparing about 100 acres of land for watermelons back in September with the planting of a rye cover crop to strengthen the soil and also to prevent soil erosion from occurring over the course of the winter. As soon as winter had passed, John plowed up the rye cover crop and began preparing a seedbed for the melons. Then, around the middle of April, after most of the danger of frost had passed and after a good rain, John had planted the watermelon seeds. During the planting process, he also had worked hundreds of tons of fertilizer into the soil. The seeds had sprouted quickly, and it looked as though there would be a good crop if only it would rain a little.

But the rains had stayed away. Every day for over a month John had checked the weather reports and scanned the sky for clouds. As the plants began to wither and die, John regretted the fact that he hadn't installed the expensive irrigation system he had considered buying the year before. Then, in late June when the crop seemed almost lost, the rains came and the field sprang to life.

Now it was August, and John would soon be checking on how the first day of the harvest was progressing. But first he had to feed a few hungry animals.

Upon arriving at the farm, John stopped by the barn where Pete Ward was waiting. Pete was a farmhand who had worked with John's family for over 20 years.

Pete was standing beside some large sacks of grain that he had brought out of the barn. Together he and John loaded the grain into the back of the pickup and drove to a nearby pen where John kept about 100 hogs. As the truck stopped by the pen, the pigs ran toward it squealing and grunting in obvious expectation of a good meal.

Pete began mixing the feed grains while John climbed into the pen to check the pigs. As soon as he entered the pen, John was surrounded by a crush of squealing pigs. He scratched the backs of a few, which the pigs loved. While he was doing that, John was checking for signs of disease or other problems. In addition, and to the pigs' misfortune, John was estimating the time required before they would be ready for market, which he determined to be about 2 more weeks.

After John and Pete finished feeding the pigs, they drove back to the barn, where they picked up a couple of salt licks, 50 gallons of molasses, and about 10 bales of hay. They then drove to a nearby field where John was grazing about 75 head of cattle. As John and Pete approached the field, the cattle began moving towards the gate, just as the pigs had done earlier. John drove the pickup slowly into the field, while Pete pulled bales of hay off the back of the truck and kicked them open for the cattle. When they finished putting out the hay, John and Pete drove across the field to some large boxes that had about a quarter of a wheel showing above each of their tops. These were molasses feeders that John used to help the cattle put on weight more quickly. When the cattle licked the wheel on top, the wheel turned, bringing up molasses from the bottom of the box. John and Pete quickly checked the molasses level in the boxes and filled up those that needed it. John was a little disappointed by the fact that the cattle didn't seem to be eating much of the molasses, but he knew that this wouldn't keep him from trying more experiments in the future. If he didn't keep improving his farm's efficiency, John knew he would not be able to compete with other farmers and would have to go out of business.

By now the sun was getting fairly high in the sky and the temperature was approaching 90 degrees, but John and Pete still had a lot to do. First, John wanted to see how the watermelon harvest was progressing. Then, if all was going well there, he and Pete would drive to another field and begin preparing the land for next year's crop.

When he arrived at the watermelon field, John felt elated, as he always did at harvest time, because for John, as for all farmers, harvesting crops or sending livestock to market provides tremendous rewards. These rewards come not only from the money gained, which sometimes isn't much, but also from a sense of pride and satisfaction at seeing the results of many months of long, hard work.

Alice, John's sister, was overseeing the harvest, so John drove over to her as soon as he got to the field. Alice was standing near a machine like a conveyor belt that was feeding melons into the backs of three large trucks. The machine also automatically separated the melons according to size. Thus small melons were going into one truck, average size melons into a truck from a large supermarket chain, and large melons into a truck from a processing plant.

Exploring Careers

"How are things going?" asked John as he got out of his pickup. "Are there any problems?"

"Nothing major," answered Alice, "but I sure could use another skilled cutter or two. We've already had one truck come back because there were too many green melons in it." Cutters are usually the most experienced and skilled field laborers in harvesting watermelons. They usually go down the rows in front of the other laborers and determine, almost by instinct, which melons are ripe. They then cut the ripe melons from the vines and stand them on end to be loaded on wagons by other laborers following behind. If the cutter selects too many unripe melons, the truck will be sent back by the agricultural broker who acts as a middleman between the farmer and the crop's buyers.

John groaned in response to Alice's request for more cutters, because he knew what she was asking. Everyone in the area was harvesting melons right now, and there wasn't an extra laborer to be found anywhere, especially a skilled cutter.

"It looks like you and I have just been drafted as cutters, Pete," said John with a grin as he looked at Pete who was pretending to hide behind the pickup.

John went home very tired that night and awoke early the next morning with very sore muscles from the constant lifting and stooping required in cutting watermelons. Nevertheless, he felt the sense of satisfaction and accomplishment that only a hard day of physical labor can bring.

There was, however, one thing that bothered him. He hadn't been able to prepare the grain field for planting as he and Pete had planned, and there were still a lot of watermelons to be harvested. John couldn't help smiling, though, when he thought of the conversation he and Pete would have while feeding the stock that morning about who would get to sit on a tractor all day and who would have to work another day as a cutter.

John hires vacationing students for the melon harvest. Following the cutters through the fields, they pick up the ripe melons and load them on wagons.

Exploring

Farmers spend much of their time outdoors in all kinds of weather.

- Do you enjoy working outdoors, or would you prefer to work in a controlled environment such as an office building?
- Do you like outdoor activities such as swimming, hiking, fishing, camping, and hunting?
- Do you mind working in the garden or mowing your family's lawn?
- Do extremes of heat or cold bother you?

Because they are their own bosses, farmers must have initiative and be self-starters.

- Do you get up in the morning by yourself?
- Do you do your homework and household chores without being prodded by your parents?
- Do you stick with projects until they are finished?
- Do you take responsibility for your family's pets?
- Do you get to class on time every day?

As farming methods grow more complex, farmers must take on more planning and managerial duties.

- Do you always finish your homework on time?
- Do you keep a diary?
- Do you use a calendar to organize your time?
- Do you make lists of things to do?
- Are you good at long-range projects, such as gardening, that require a good deal of organization?
- When you are in control of a project, can you get people to work without resenting you?

John sells some of his crop at the local auction. "It gives me a chance to socialize with other farmers while I do business."

Farmers must respect the environment.

- Do you throw trash in the trash can?
- Does it bother you when you see a polluted river?
- Do you save cans for recycling?

Farmers must work with machinery and often maintain and repair their own equipment.

- Do you like to build things?
- Do you like to work with your hands?
- Do you repair your own bicycle?
- Do you like to learn how machines work?
- Are you handy with tools?
- Before you start working on something, do you think about how you will go about it?

Suggested Activities

Listen to the farm reports on your local radio or television station. Look up any terms whose meaning you don't know.

Your newspaper's financial section lists the day's prices for a variety of farm products. Follow the price of a particular product, such as wheat or corn, over a period of time. Can you see how fluctuations in crop prices would affect you as a farmer?

Write a report on one or more of the following things that farmers must deal with: Plant varieties, plant diseases, cattle varieties, animal diseases, insects, chemicals, fertilizers, and soil types.

Go to a livestock auction if there is one in your area. Make a list of the grades and types of animals sold at the auction and the prices they sell for.

Visit the meat counter of your local grocery store or supermarket. Note the various cuts and grades of beef that are sold. Can you see any difference in the various grades of meat?

Visit a farm equipment dealer if there is one in your area. Find out why there is such a wide range in tractor sizes and horsepower. Look at the various farm implements that are for sale and try to figure out how they work, and what they are used for.

Try to get permission to accompany a veterinarian who treats farm animals. Note the types of animals that are treated, what some of the most common ailments are, and how the veterinarian handles these ailments.

For more information on farming as a career, read *Careers in Agriculture and Natural Resources*, published in 1976 by the National Association of State Universities and Land Grant Colleges. Your library or State agricultural college may have this booklet.

Join a farming organization for young people such as the Future Farmers of America or the 4-H Club. Members of these organizations gain practical experience in agriculture and take part in fairs, agricultural contests, horse shows, and many other activities.

If you are a Boy Scout, try for merit badges in Agriculture, Animal Science, Beekeeping, Botany, Farm Arrangement, Farm Mechanics, Farm Records, Gardening, Plant Science, Rabbit Raising, Soil and Water Conservation, and Veterinary Science.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Animal Kingdom, Conservation, Food Raiser, Horsewoman, and Plant Kingdom.

Plan a small garden for your yard or any small plot of land you can get permission to use. Here are some things you might want to do before you plant anything.

- Obtain soil samples from the plot you have selected and take them to your county agent for testing. When the results come back, ask the agent to explain them to you and to recommend what to plant and what kind of fertilizer to use.
- Send for some garden seed catalogs. These will give you an idea of the wide number of crop varieties available and provide valuable information on planning your garden.

Try to obtain first-hand experience in farming by getting a part-time or summer job on a farm or ranch.

Join an Agriculture, Veterinary, or Conservation/Ecology Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

Write the Dean of Agriculture of your State's land grant college or university. The Dean can provide you with information on careers in agriculture, and the training they require.

See if you can solve the following math problems which are typical of some of the simpler calculations farmers must make in planning their activities:

1. Bill Jenkins, a Kansas farmer, plans to raise 600 acres of wheat this year. If Bill gets 40 bushels of wheat per acre, how many bushels will he raise?

2. Bill plans to spend about $100 per acre on growing the wheat.
   a. At what market price per bushel will Bill break even?
   b. What price per bushel does he need to get in order to make $24,000?

3. A farmer plans to put a four-strand barbed wire fence around a 640-acre plot of land (640 acres = 1 section = 1 square mile). Barbed wire costs $35 for a ¼-mile roll. How much will the wire for the fence cost?

4. A cattle feedlot operator has determined that her cattle gain 1 pound of weight for every 5 pounds of feed. The price of cattle is now 50¢ per pound. Grain costs $4.80 for a 60-pound bushel. What is the operator's profit or loss for each bushel fed?

See answers at end of chapter.

Related Occupations

Farmers aren't the only people involved in producing agricultural products. People in many other occupations work outdoors and assist in the production of crops and animals. Some of these jobs are described below. If you need to, refer to the list of job titles at the end.

1. Although I don't own a farm, I have the same planning and management responsibilities that a farmer has. Who am I?

2. I repair and maintain farm machinery and equipment. I work for a tractor dealer. Who am I?

3. I do much of the physical labor on the large farm on which I work. Who am I?

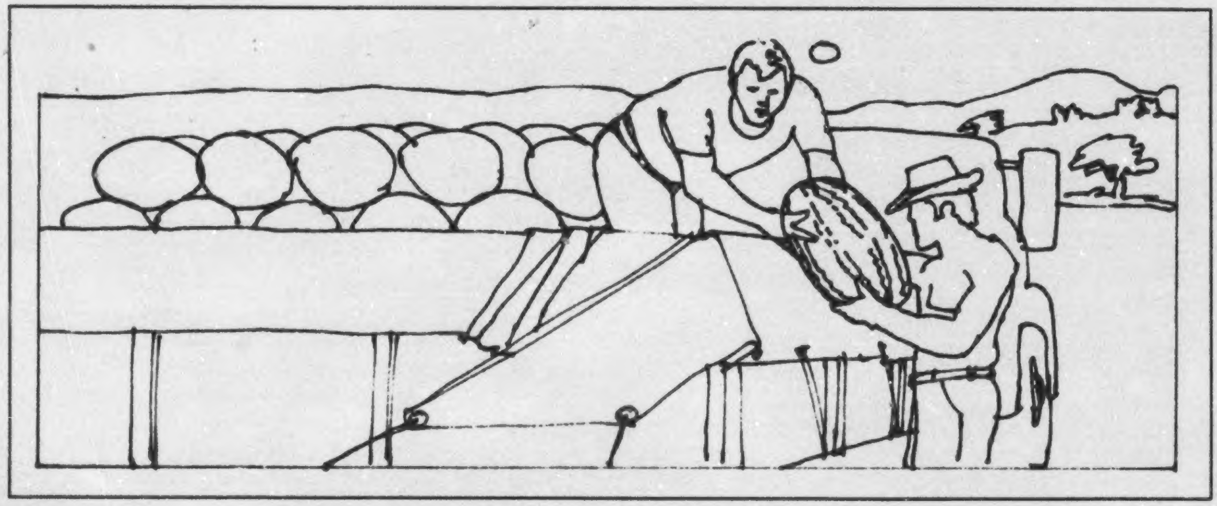
4. I apply fertilizers and insecticides to crops by flying over them with my plane. Who am I?

5. I act as an agent between farmers and the people who buy their crops. Who am I?

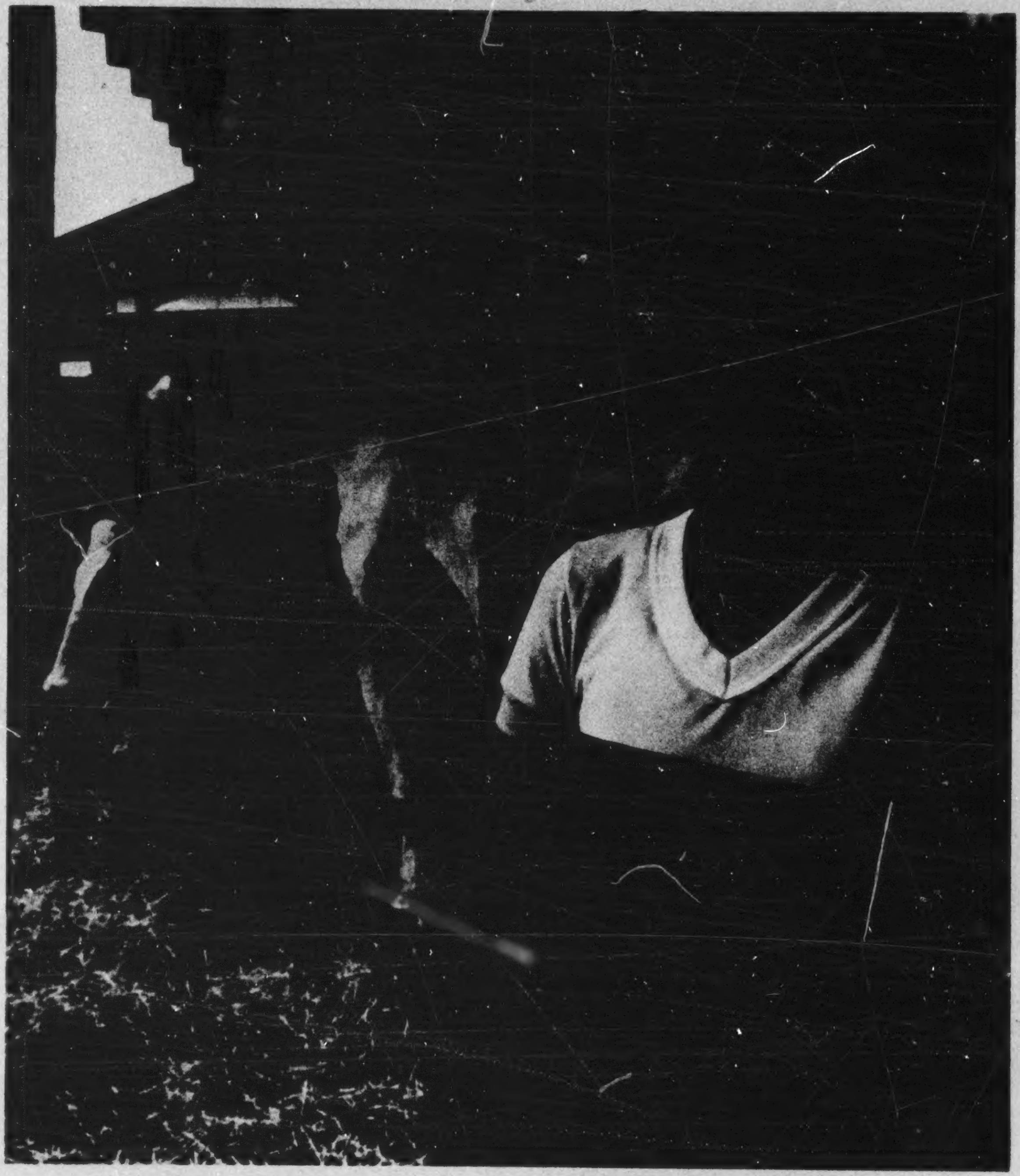
6. When farmers' animals get sick or need treatment, I am the one who usually diagnoses the problem and treats it. Who am I?

Agricultural pilot
Agricultural products broker
Farm equipment mechanic
Farm laborer
Farm manager
Veterinarian

See answers at end of chapter.



Cooperative Extension Service Worker



Bev Williams has a master's degree in dairy science. "I grew up on a farm," says Bev, "so it seemed natural to make agriculture my career."

Agriculture, Forestry, and Fishery Occupations

It was a cold winter night on a dairy farm in northern Maryland. Jack and Anne Medgar, the owners, were relaxing before the fire after a hard day's work. Jack was reading a farm trade journal, *Modern Dairy Farmer*.

"Listen to this, Anne," he said with a laugh. "Dairy farmers in Ohio are feeding their cattle cement and getting increased milk production. Can you believe that crazy idea?"

"I'm not sure it's such a crazy idea, Jack," said his wife. "Agricultural science is continually coming up with new ideas. Some of the things you do now on the farm wouldn't have been possible 20 years ago. Why don't you call Bev Williams and see if she's heard of it? Who knows, using cement might increase milk production on this farm."

A few days later, Jack called Bev, the county extension service agent. He asked her about cement in cattle feed.

"I have read about it," Bev assured him, "but it is still in the experimental stage. In fact, the university is now testing it. The idea is to use cement dust as a dairy cattle feed supplement. Apparently the idea has been tried a few times and has resulted in higher milk production. But it hasn't been done under controlled conditions, and we're not sure if there is a connection between the cement and the milk production. Possibly the high calcium content of the cement dust is a factor. I'll try to keep abreast of the research, though, and see if it might work in your farming operation."

As she put down the phone, Bev made a mental note to call the scientist at the university who was in charge of that research project and find out how the experiment was going.

"I might even mention this in my monthly newsletter," she thought.

Bev doesn't get calls about feeding cement to cattle every day. But she has to be prepared for calls like Jack's. Keeping track of current agricultural research, making it known to farmers, and encouraging them to use the results of this research—that's what a county extension service agent's job is all about.

Farmers have to be convinced that new ways of doing things are worth trying. They won't listen to just anyone who comes along with advice. Bev and other extension agents need years of training to develop the expertise that will make listening to their advice worthwhile. Extension agents usually know a lot about agriculture from growing up on a farm—or at least having a farm background.

Bev grew up on a dairy farm right in the area. After high school, where she was active in 4-H, she attended the State agricultural university. There she earned a bachelor's degree and then went on to earn a master's degree in dairy science. After graduation, she worked for a farm supply company for about 5 years before getting the job she has now.

Now let's look at one of her workdays. There's no such thing as a "typical" day for Bev. There's so much variety in her job that every day is different. That's one of the things she likes best about the job.

Today, Bev will be spending most of the morning in her office. As soon as she gets there, Bev goes through her mail. She notices some soil test results from the university and sets them aside. She'll go over them later. When she examines the soil results, she'll decide on fertilizer and crop recommendations. Later on, she'll discuss these with the farmers who submitted samples of their soil.

As she continues to go through the pile of mail, she finds circulars from farm supply companies promoting new machines, seeds, feeds, and chemicals. She looks these over carefully since farmers often ask her opinion on new developments in farm supplies.

Bev then turns to the rest of her paperwork. She puts together her notes for the report she has to submit to the university four times a year. In this report, Bev will list the farmers she has been in touch with, describe the advice she has given them, and explain how her suggestions are working out.

Bev also works on her monthly newsletter for the farmers in the county. In the newsletter she discusses new research developments, such as the cement dust in cattle feed. She also reports on regulations and government policies affecting farmers and on agricultural prices and farm management.

Around 11 o'clock, Bev leaves her office and drives to the local radio station to tape her weekly farm report. She usually chooses a topic that will interest most farmers in the county. This week, for example, she discusses some of the methods for controlling Johnson Grass, a weed that infests many farms. After lunch, Bev drives to a dairy farm to go over a suggested feeding program for the farmer's herd. The farmer had noticed a decline in his herd's milk production and about 2 weeks ago asked Bev if she had any suggestions. Bev had told the farmer to bring some forage samples of his hay and silage into the extension office. She sent the samples to the State agricultural university for analysis. When the results came back, Bev studied them carefully, noting among other things the protein and water levels of the forage. Now, she and the farmer are working together on a feeding plan that would be economical but still ensure good milk production. After a few hours of work, they finally arrive at what they both think will be a good combination of roughage and grain for the farmer's herd.

Bev's next stop is at a farm whose owner has asked for help concerning a sensitive financial question. The farmer is nearing retirement and would like to see his son take over the farm. The son has the knowledge and ambition to take over the farm, but he doesn't have the money to buy the farm. Bev and the farmer and his son sit down and discuss the situation from all angles. Finally, the farmer reaches a decision that would give him a retirement income and still enable the son to enter the farming business. He decides to sell the cows and machinery to his son and keep the land. The son would then rent the land from his father. While Bev does not make this decision for the farmer, she does help present him with a wide range of options from which to choose. Helping the farmer make a wise decision gives Bev a real feeling of satisfaction.

By now it is after dark, so Bev does not return to her office. But her workday is still not over. She drives home to have supper and get ready for a meeting she is to attend that night. The meeting is being conducted by a farmers' organization, and Bev wants to be there for two reasons. First, she will have the opportunity to speak with a number of farmers and thus keep informed of their latest concerns. Second, she knows the subject matter of the meeting will be of interest to a number of farmers who cannot attend. By attending, Bev can later answer any questions they have about the meeting. Perhaps one of her answers to a farmer's question will help the farmer run a more productive and profitable operation.

Exploring

Extension agents must be able to work with and gain the respect of other people.

- Do you listen to what your friends have to say?
- Do you enjoy participating in group activities?
- Are you a leader in these activities?
- Do you enjoy speaking in front of your class?
- Are you good at giving directions?
- Do you organize activities?
- Do people ever ask you for your opinion?

Extension agents advise farmers on methods chosen from a wide variety of alternatives.

- Are you able to plan your time effectively?
- Can you set priorities?
- Do you like looking into all of the various aspects of a subject?
- Do you have trouble making decisions when given a wide range of choices?
- When buying clothes, do you buy the first ones you see, or do you shop around for something better?

Extension agents must be able to express themselves well both orally and in writing.

- Do you keep a diary?
- Do you write many letters?
- Do you enjoy explaining things to people?
- Do you like writing themes in English class?

Even after they complete school, extension agents must keep abreast of new developments in agricultural science and farming methods.

- Do you enjoy reading on your own?
- When you see something that interests you, do you enjoy learning more about the subject?
- Do you enjoy school subjects such as science?
- Do you like reading about your hobbies?
- Are you interested in how things work?

When farmers seek help from extension agents, they depend on getting help quickly and efficiently.

- Can people depend on you?
- Do you do the things you promise to do?
- Do you get to class on time everyday?
- Do you ever volunteer to help around the house?

Suggested Activities

Plan a small garden for your yard or any small plot of land you can get permission to use. Here are some things you might want to do before you plant anything.

- Obtain soil samples from the plot you have selected and take them to your county agent for testing. When the results come back, ask the agent to explain them to you and recommend what to plant and what kind of fertilizer to use.
- Send for some garden seed catalogs. These will give you an idea of the wide number of crop varieties available and provide valuable information on planning your garden.

Try to obtain first-hand experience in farming by getting a part-time or summer job on a farm or ranch.

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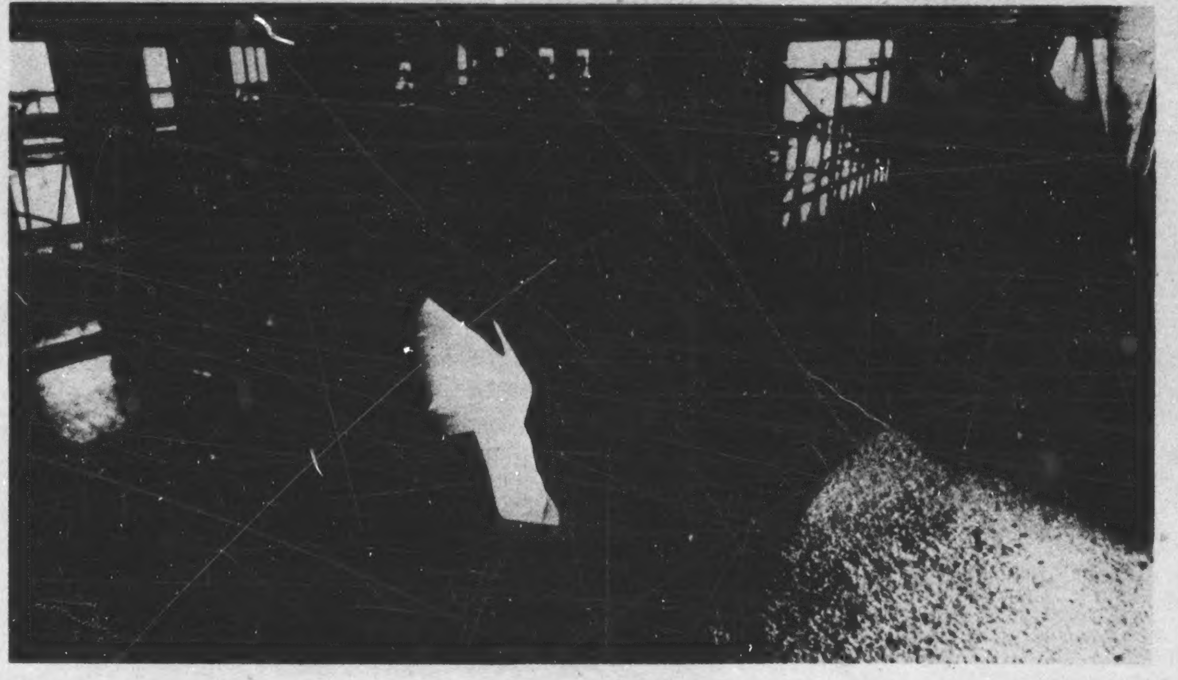

Bev discusses a feed problem with a dairy farmer. "If I can't solve a problem, it's my job to find someone who can."

Write articles for your school newspaper. If your school doesn't have a newsletter, start one. This will help develop your writing skills, which are essential in extension service work.

Spend time on hobbies and other activities in which you build, repair, or maintain things. Work on your bicycle. Do carpentry. Check the oil, water, and tires on your family's car. Make repairs around your home. Try an electronics project for your school's science fair. These activities will help you understand the problems that farmers face daily in repairing and maintaining the many buildings and the variety of equipment found on modern farms.

Invite your county extension agent to speak to your class about his or her job. Prepare questions in advance.

Help teach youngsters about the outdoors. You might lead nature walks and help them learn about the environment by identifying trees, plants, flowers, insects, birds, and other wildlife. This will help you develop teaching and leadership skills.

Join a farming organization for young people such as the Future Farmers of America or the 4-H Club. Members of these organizations gain practical experience in agriculture and take part in fairs, agricultural contests, horse shows, and many other activities.

Visit the agricultural exhibits at a county or State fair. Usually, there will be young people at the fair exhibiting their own animals. Speak with these young exhibitors and ask them about their animals, what is involved in caring for the animals, and how the exhibitors feel about a career in agriculture.

Do a report on the six major breeds of dairy cattle. To help remember what you learned, try to identify the breeds you see on farms whenever you are driving through rural areas.

See if you can get permission to visit a farm in your area. While you are there, ask the farmer or farm workers about the products they raise and the different tasks involved with raising these products.

Exploring Careers

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Animal Kingdom, Plant Kingdom, Science, Conservation, Games Leader, and Reporter.

If you are a Boy Scout, try for merit badges in Agriculture, Animal Science, Beekeeping, Botany, Communications, Environmental Science, Farm Arrangement, Farm Mechanics, Farm Records, Gardening, Pigeon Raising, Plant Science, Public Speaking, Rabbit Raising, Soil and Water Conservation, and Veterinary Science.

Join an Agriculture, Conservation/Ecology, Education/Teaching, Veterinary, or Science Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer Posts in your area, call "Boy Scouts of America" listed in your phone book, and ask for the "Exploring Division."

For more information on a career in agriculture, read *Careers in Agriculture and Natural Resources,* published in 1976 by the National Association of State Universities and Land Grant Colleges. Your State agricultural college can also provide information on crop and animal farming and extension programs in your State.

Write to the Science and Education Administration-Extension, U.S. Department of Agriculture, Washington, D.C. 20250, and ask for the pamphlet, *Your Career as an Extension Agent.*

Related Occupations

There are many other occupations concerned with improving the productivity of agriculture. Some of these are listed below, along with possible definitions of what the worker does. For each occupation, see if you can choose the correct definition.

1. **Soil Conservationist**

   a. Provides technical assistance to farmers and others concerned with preventing damage to land or streams.
   b. Makes plastic tarps to prevent soil from becoming bruised during hailstorms.
   c. Evaluates timber stands to determine amount of wildlife they can support.

2. **Veterinarian**

   a. Administers programs for soldiers leaving the Armed Forces.
   b. Diagnoses, treats, and controls diseases and injuries among animals.
   c. Provides counseling services to aging athletes.

3. **Soil Scientist**

   a. Categorizes soils according to a national classification system.
   b. Studies effectiveness of various detergents in removing soils.
   c. Encourages the removal of vegetation to help prevent erosion.

4. **Farm Manager**

   a. Directs the activities of all farmers in a State.
   b. Manages the Federal Agricultural Resource Marketing (FARM) Program.
   c. Plans and directs agricultural activities on large farms.

5. **Animal Breeder**

   a. Artifically impregnates cows and ewes.
   b. Develops improved breeds of animals that will be more productive.
   c. Selects animals to be used to provide energy in breeder reactors.

See answers at end of chapter.

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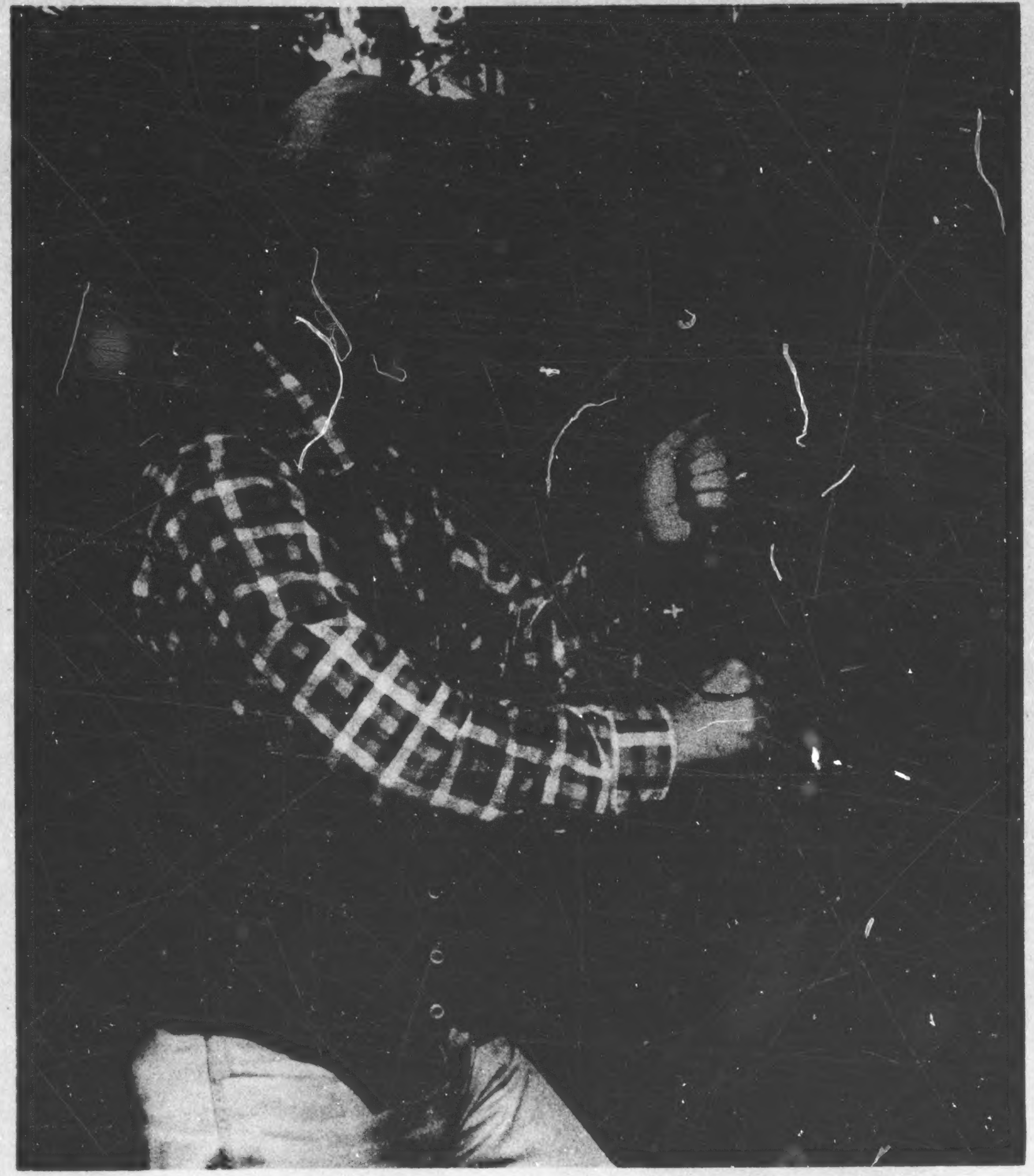
Forester



Paul Ivy manages over 60,000 acres of timberland. With this tool, he can find out how fast his trees are growing.

Exploring Careers

Paul Ivy works as a forester for a medium-sized forest products company based in the Middle Atlantic region of the United States. Although he has been working for only a few years, Paul's job is an important one. He is responsible for managing over 60,000 acres of company timberland that is scattered over a 10-county area. Managing this land encompasses a wide range of duties including budgeting, planning, mapmaking, and overseeing the planting, clearing, harvesting, and selling of the trees. The variety makes Paul's work even more interesting.

Paul didn't just suddenly decide to become a forester. As a youngster, he was active in Scouting and enlarged his interest in and knowledge of the outdoors. Then he attended a college with a forestry curriculum and obtained a bachelor's degree in forestry. While in college, Paul participated in a work-study program 6 months out of each year. In this program, Paul acquired practical experience working as a forestry technician in the National Parks in Montana. Then, during the final summer before his graduation, Paul got a job with a private company. They liked his work and hired him full time when he graduated from college.

There is really no such thing as a typical workday for Paul. His job has variety. In the summer, for example, he may have to direct firefighting activities, while in the winter he may have to check on the company's logging roads to be sure they are passable.

Today, however, is a beautiful March day, and he has neither of these problems. But he does have a full day ahead.

After breakfast, Paul gets in his pickup truck and drives about 30 miles to a section of land being "cruised" by forestry aides. The aides are trying to determine how much marketable wood there is in this particular forest stand. To do this, they have to find out a number of things, including how many trees there are and how much wood each tree contains. Obviously, they cannot count and measure every tree in the stand. Instead, they mark off a typical sample area of the stand and carefully count and measure the trees in the sample area. They also use a tool called an increment borer to determine the age of the trees in the stand. This tool, without harming the tree, can take a pencil-thin sample from the tree's core. To determine the tree's age, the aides simply count the number of rings present from the center to the

Paul has been interested in the outdoors since he was a youngster. "I started thinking about a forestry career when I was working on Scout merit badges," he recalls.

edge of the tree. They can also tell how fast the tree is growing by looking at the distance between the rings.

By the time Paul arrives, the aides have almost finished "cruising" this timber stand. He helps them finish and then carefully records the data they have obtained. When Paul returns to his office, he will enter the data into a computer and onto detailed maps of the tract he has prepared. Then he can determine if the tract is ready to be harvested and, if so, how to harvest the timber in a way that will not harm the environment.

Paul's next stop is at another tract nearby that has just been harvested. Now the site is being prepared for replanting. Paul wants to be sure that the work is going well and according to plan. Much of Paul's work on this tract was completed long ago. Even before the trees were cut, for example, he decided which trees should be left to provide windbreaks and cover for wild game and protection from erosion. These remaining trees are called a leave strip.

Today, huge bulldozers and other pieces of earthmoving equipment are making windrows on the bare land. This is similar to the contour plowing done by farmers and serves the same purpose. Windrowing helps protect the land from erosion. Paul is pleased with the work and compliments the workers on a job well done. Before leaving, he checks to see if they need any more equipment or supplies.

By now it is almost time for lunch, so Paul drives into a nearby town to buy a sandwich. He eats in the truck while driving to a site about 20 miles away.

This site has already been prepared for planting but is on very uneven land. Because the land is so uneven, it is impossible to use the automatic tree-planting machine that can plant up to 8,000 trees in a day. Instead, the company has hired inexperienced laborers who can at best hand plant only about 1,000 trees per day. Paul wants to check to see that the work is going well and is being done properly.

When he arrives at the site, Paul is not at all happy with what he sees. The laborers have begun planting, but Paul knows many of the trees cannot possibly survive, as they have been improperly planted. Some seedlings, for example, have been planted too deep in the ground, while others don't have enough soil around them. One worker has even planted some seedlings upside down!

Paul doesn't lose his temper, though, as he knows it

Paul can estimate the number of trees in an area by studying an aerial photograph.

would do no good and, in fact, might really alienate the workers. Instead, he patiently and clearly explains how the job should be done. He also talks a little about the business in general and answers any questions the workers have. Paul then works with the men for a couple of hours, planting trees himself and just talking with the workers. Once he is sure the job is going properly, he gets into his pickup truck for the drive back to the office.

The next item on Paul's schedule for today is a short budget meeting at his office. During the meeting, Paul and his supervisory employees discuss how much money can be spent on the various timber operations under his control. This requires some difficult decisions since there is only a certain amount of money available to divide among a number of forestry operations. Should they spend operating money to purchase some new fire-fighting equipment, or would the money be better spent on additional fertilizer for the growing trees?

After the budget meeting, Paul speaks individually with a few of the people around the office before going into his office to do paperwork for about an hour. During this time, he makes notes on some of the items discussed in the budget meeting and also works for a while on the map of the area he helped cruise this morning.

Then Paul decides to call it a day and gets in his pickup to drive home. On the way home, however, he receives a call over his two-way radio about a complaint from Jan Wiley, who owns land nearby. Apparently, the heavy equipment of one of the company loggers is tearing up a road on her land. The farm is nearby, so Paul decides to stop by and speak with Ms. Wiley. After visiting with her and looking at the damage to the road, Paul promises to get the road fixed. This calms Ms. Wiley, and Paul finally goes home.

But his day is not quite over. After supper tonight, Paul is scheduled to speak to a high school science club on forestry and the economic and environmental roles of his company. This is a part of his job that Paul really enjoys. In fact, he has even developed a slide show to help make his talks more interesting and meaningful to the students.

Exploring

Foresters must be well organized and able to set priorities.

- Are you able to plan your time efficiently?
- Do you keep lists of things to do?
- Do you find yourself able both to finish your homework and have time left for recreation?
- Do you keep a diary?
- Do you have trouble deciding between different things to do?
- Do you take part in extracurricular activities at your school?

Foresters must be patient to see the end results of their work.

- Do you enjoy long-term projects, such as gardening?
- Do you ever think about or plan what you will be doing 5 years from now?
- Can you save your money for something you want?

Foresters often must work with other people. There's a lot more to the job than just being out in the woods.

- Do you like to speak in front of your class?
- Do you enjoy working with other people on class projects?
- Do you join organizations and take an active part in them?
- Do you like to help organize activities such as trips, parties, sports events, picnics, and dances?

Foresters must have a genuine love of the outdoors and respect for the environment.

- Do you enjoy outdoor activities such as camping, fishing, hunting, gardening, and hiking?
- Does it bother you when you see a polluted river?
- Do you ever try to think of ways to make the river clean again?
- Do you throw your trash in the trash can?

Suggested Activities

Plan and take part in a science club activity at your school. Activities might include planting trees, pulling weeds, controlling insects, and other outdoor activities.

Volunteer to help with clearing brush, cleaning up a stream, or some other activity that helps our environment.

Try some outdoor hobbies such as hiking, fishing, camping, and birdwatching.

Make a map of your neighborhood or a small park in your area. On the map, show all the trees in the area, their type, and their approximate size. See if you can devise a code for doing this. P 60/20, for example,

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might indicate a stand of 60 pine trees, each about 20 feet tall. Using the map you have prepared, see if you can determine what areas could perhaps be thinned and what areas might benefit from a tree planting program.

Get a summer job working on a farm, or find other outdoor summer employment, such as being a camp counselor. Mowing lawns, working in a nursery, and gardening are other good possibilities.

Locate the nearest county, State, or Federal forest in your area. Invite the forester in charge to speak to your class about his or her job. Prepare questions in advance.

If there is a logging or lumber company in your area, call the public relations department and ask if a speaker would be willing to visit your class and explain the company's operations.

Use forestry as a topic for class assignments. Do a report on the lumber industry for a social studies class. Prepare a report on different kinds of wood, their characteristics and uses, for a science class.

Help teach youngsters about the outdoors. You might lead nature walks and help youngsters identify trees, plants, flowers, insects, birds, and other wildlife. Volunteer your services to a day camp, community center, school, or church.

Join a farming organization for young people such as the Future Farmers of America or the 4-H Club. Members of these organizations gain practical experience in agriculture and take part in fairs, agricultural contests, horse shows, and many other activities.

If you are a Boy Scout, try for merit badges in Agriculture, Bird Study, Botany, Camping, Environmental Science, Fish and Wildlife Management, Forestry, Gardening, Insect Life, Nature, Plant Science, Pulp and Paper, Soil and Water Conservation, Surveying, Wildlife Management, and Wilderness Survival.

If you are a Girl Scout, see if your local troop has the From Dreams to Reality program of career exploration. Troops may also offer opportunities to try out careers through internships, service aide and community action projects, and proficiency badges in a number of areas including Animal Kingdom, Campcraft, Conservation, Family Camper, Food Raiser, Games Leader, Hiker, Outdoor Safety, and Plant Kingdom.

Join an Outdoor, Conservation/Ecology, Agriculture, Hunting, Fishing, or Natural Science Explorer Post if there is one in your area. Exploring is open to young men and women aged 14 through 20. To find out about Explorer posts in your area, call "Boy Scouts of America", listed in your phone book, and ask for the "Exploring Division."

For information about careers in forestry, write to the Society of American Foresters, 5400 Grosvenor Lane, Washington, D.C. 20014; American Forest Institute, 1619 Massachusetts Avenue, N.W., Washington, D.C. 20036; U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

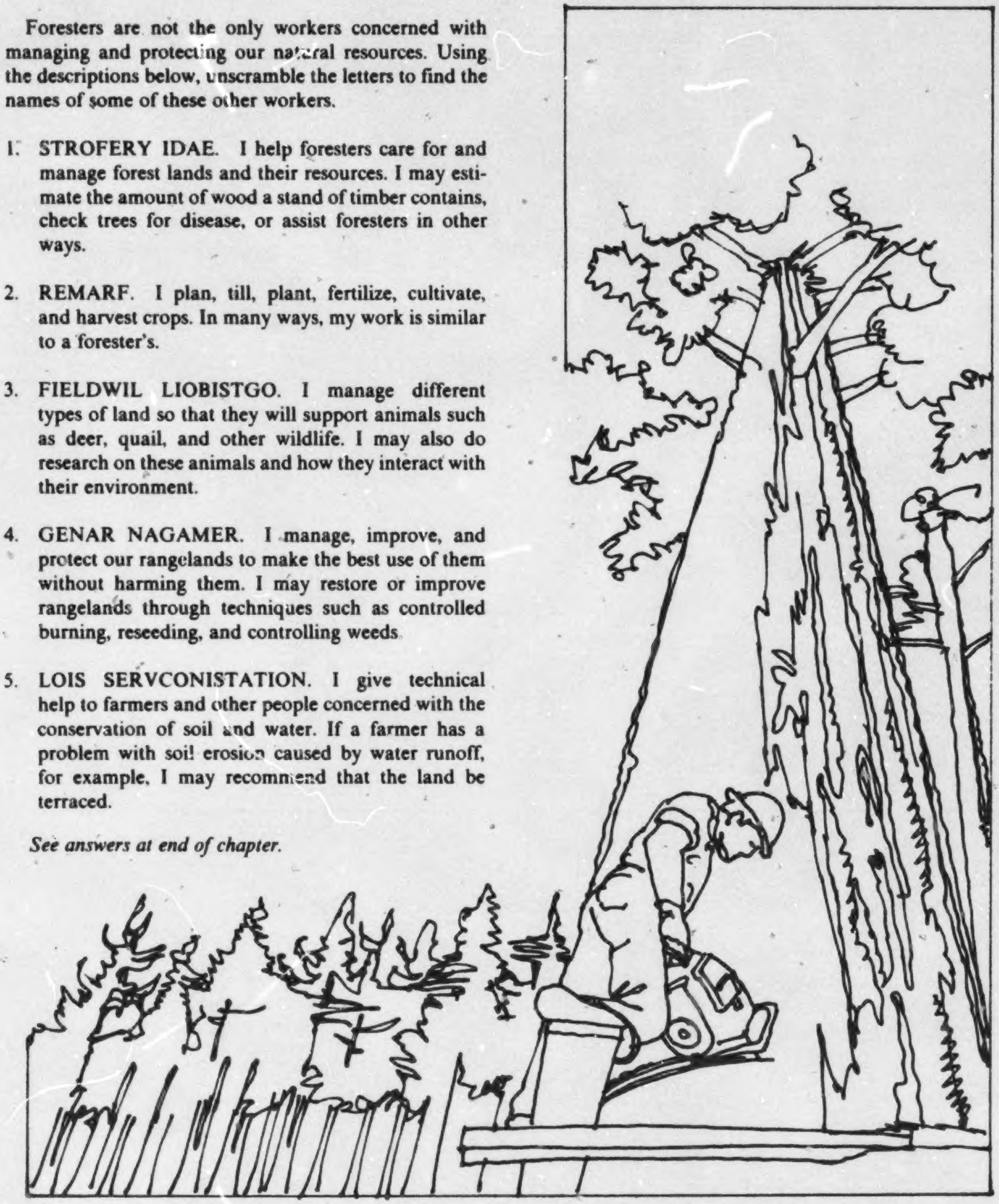
Exploring Careers

Related Occupations

Foresters are not the only workers concerned with managing and protecting our natural resources. Using the descriptions below, unscramble the letters to find the names of some of these other workers.

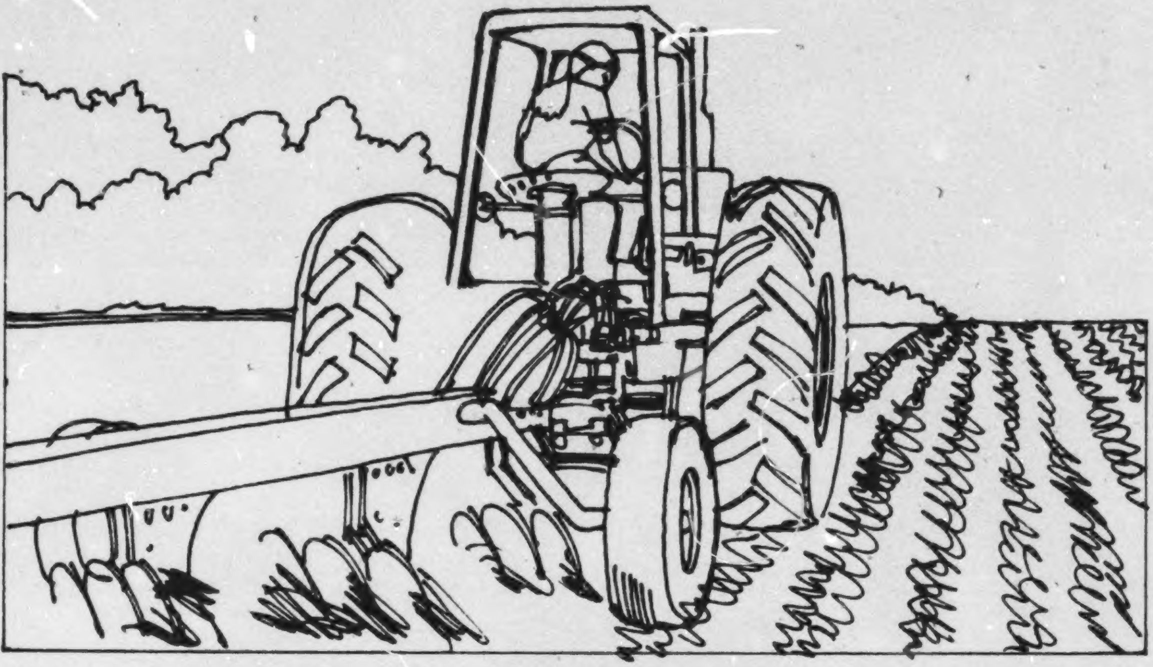
1. STROFERY IDAE. I help foresters care for and manage forest lands and their resources. I may estimate the amount of wood a stand of timber contains, check trees for disease, or assist foresters in other ways.
2. REMARF. I plan, till, plant, fertilize, cultivate, and harvest crops. In many ways, my work is similar to a forester's.
3. FIELDWIL LIOBISTGO. I manage different types of land so that they will support animals such as deer, quail, and other wildlife. I may also do research on these animals and how they interact with their environment.
4. GENAR NAGAMER. I manage, improve, and protect our rangelands to make the best use of them without harming them. I may restore or improve rangelands through techniques such as controlled burning, reseeding, and controlling weeds.
5. LOIS SERVCONISTATION. I give technical help to farmers and other people concerned with the conservation of soil and water. If a farmer has a problem with soil erosion caused by water runoff, for example, I may recommend that the land be terraced.

See answers at end of chapter.



Agriculture, Forestry, and Fishery Occupations

Job Facts



There isn't room in this book for a story about every agriculture, forestry, and fishery occupation. However, you'll find some important facts about 18 of these occupations in the following section. You can find additional information about some of them in the Department of Labor's *Occupational Outlook Handbook*, which should be available in your school or public library.

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
AGRICULTURAL PRODUCTION OCCUPATIONS			
Farmers	Farmers plan, till, plant, fertilize, cultivate, and harvest crops. Those who raise livestock must feed and care for their animals, and keep barns, pens, milking parlors, and other farm buildings clean. The size of the farm determines how many of these tasks farmers do themselves. On most farms, the farmer does the work with the help of one or two family members or hired hands. Large farms, however, have 100 employees or more.	Experience gained growing up on a farm is very important. A college degree in agriculture is important, too. It is almost essential for people who haven't grown up on a farm. Most colleges of agriculture offer programs in dairy science, crop science, agricultural economics, horticulture, and animal science. Physical stamina and strength are important. Initiative, resourcefulness, and a sense of responsibility are essential. High school courses in mathematics, accounting, shop, and science are helpful, as are courses in vocational agriculture.	Most farmers own or rent the land they farm. Farmers are usually their own bosses. However, land and equipment costs are very high, and many young farmers start out as hired hands or tenant farmers.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Farm Managers	These workers perform much the same duties as farmers. They usually work for others, however, unlike farmers, who are generally self-employed. Farm managers usually work on large farms or for corporations engaged in agribusiness.	A farm background is helpful, and a college degree in agriculture is important. Workers should be good at planning work and supervising people. High school courses in math, accounting, shop, and science are helpful, as are courses in vocational agriculture.	Beginning farmers who cannot afford to purchase their own land, buildings, and equipment may find opportunities in this field.
Farm Laborers	Farm laborers, also known as farm hands, help do all kinds of work. They may, for example, operate farm equipment, feed and care for livestock, and help in harvesting crops. Job duties usually vary according to season and type of farm product. Most laborers are employed on the larger farms.	Farm laborers should be in excellent physical condition. Stamina and strength are important since they must often work long days on their feet or stooped over under the hot sun and may have to carry heavy objects such as bales of hay. High school courses in vocational agriculture are helpful.	A job as a farm laborer is a good way of gaining farm experience. Some of these workers are members of unions.
Farm Labor Supervisors	These workers oversee farm laborers and are responsible for seeing that assigned tasks are done properly and on time. They coordinate work activities, such as planting, cultivating, and harvesting. They schedule the work of crews and may hire additional hands, especially during the harvesting season. They work under the general direction of farmers or farm managers.	A sense of responsibility and the ability to direct and work well with others are essential. A farm background is an asset. High school courses in vocational agriculture are helpful.	Most jobs are on large farms that employ farm laborers.
AGRICULTURAL SUPPORT OCCUPATIONS			
Cooperative Extension Service Workers	These workers conduct educational programs for rural residents. They give farmers technical advice, help farm families learn about home economics and home management, organize activities for youth, and help community leaders plan economic development. Extension workers usually specialize. They may deal primarily with farmers, with community leaders, or with youth.	Extension workers must have at least a bachelor's degree in their subject field. They often receive additional training on the job. They should like working with people and have a genuine desire to help them. A farm background is almost a requirement for agricultural extension workers. High school courses in English, public speaking, science, and math are helpful, as are courses in vocational agriculture.	Most extension service offices are located in small towns. People who are good at teaching and getting ideas across, and who wish to live outside the city, may find extension work the ideal career.

Agriculture, Forestry, and Fishery Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Soil Conservationists	These workers provide technical assistance to farmers, ranchers, and others concerned with the conservation of soil and water. They help develop programs that make the most productive use of the land without damaging it. Most work for the Federal Government. Others work for State and local governments or teach at colleges and universities. Some work for rural banks that make loans for agricultural lands and for lumber and paper companies that have large holdings of forested land.	Only a few colleges and universities offer a degree in soil conservation, and most soil conservationists have college degrees in agronomy. High school courses in math, science, English, and public speaking are helpful. They should be able to get along easily with others and get their ideas across, since their job is one of educating farmers and ranchers about sound conservation practices.	Soil conservationists do most of their work in the field.
Soil Scientists	These workers study the characteristics of soils to help us use our soil resources wisely. Some study the chemical and biological properties of soils to determine their uses in farming. Most, however, prepare maps showing different kinds of soils that are used by builders, land developers, and planners. More than half work for the Soil Conservation Service of the U.S. Department of Agriculture.	A bachelor's degree with a major in soil science or a closely related field, such as agronomy or agriculture, is the minimum requirement.	Soil scientists generally spend much of their time doing field work, which requires travel.
Range Managers	Range managers manage, improve, and protect range resources to maximize their use without causing damage to the environment. They may, for example, determine the number of animals that can be grazed on a given area of range. The majority work for the Federal Government. State game and fish departments also employ range managers, and private industry is hiring increasing numbers. Range managers also work in such closely related fields as wildlife and watershed management, forest management, and recreation.	A bachelor's degree in range management, range science, or a closely related field, such as agronomy or forestry, is the usual minimum educational requirement. Besides having a love for the outdoors, range managers should be able to speak and write effectively and work with others. High school courses in biology, chemistry, physics, and mathematics are helpful.	These workers also are known as range scientists, range ecologists, or range conservationists. Range managers may spend considerable time away from home working outdoors in remote parts of the range.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Agricultural Engineers	These workers are concerned with improving efficiency in agriculture. To do this, they design machinery and equipment and develop new methods used in the production, processing, and distribution of food and other agricultural products. Most work for manufacturers of farm equipment, electric utility companies, and distributors of farm equipment and supplies. Many do farm consulting work independently or for consulting firms. Others work for the U.S. Department of Agriculture, for colleges and universities, and for State and local government agencies.	A bachelor's degree in engineering is required for most beginning jobs. Some engineering jobs are filled by people trained in the appropriate natural science or in mathematics. Graduate study is increasingly important for advancement. Engineers should be able to work as part of a team and should have creativity, an analytical mind, and an ability to deal with details. They should be able to express their ideas well orally and in writing. High school courses in mathematics, physics, chemistry, and English are helpful.	Agricultural engineers may work in research and development, production, sales, or management.
Food Scientists	Most of these workers do research on the chemical, physical, and biological nature of various foods. They then apply this knowledge to come up with new food products, improved processing and packaging techniques, and better ways of storing an adequate, wholesome, and economical food supply. Others work in quality control in laboratories or in production areas of food processing plants. Food scientists work in all sectors of the food industry and in every State. Some do research for Federal agencies, such as the Food and Drug Administration. A few work for private consulting firms or agencies, such as the United Nations. Others teach or do research in colleges and universities.	A bachelor's degree in food science, biology, or chemistry is the minimum requirement for beginning positions. Many jobs, especially teaching and research, require a graduate degree. Food scientists with a bachelor's degree might start work as quality assurance chemists or as assistant production managers. After gaining experience, they can advance to more responsible management jobs. A food scientist might also begin as a junior food chemist in a research and development laboratory of a food company and be promoted to section head or another research management position. People who have master's degrees may begin as senior food chemists in a research and development laboratory. Those who have doctor's degrees usually begin their careers doing basic research or teaching. High school courses in biology, chemistry, physics, mathematics, home economics, and English are helpful.	Food scientists work with different products, depending upon the part of the country where they are employed. In Maine and Idaho, for example, they work with potato processing; in the Midwest, with cereal products and meat-packing; and in Florida and California, with citrus fruits and vegetables.

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Agriculture, Forestry, and Fishery Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
Farm Equipment Mechanics	These workers maintain and repair the wide variety of agricultural equipment used in modern agriculture. Most work in service departments of farm equipment dealers. Others work in independent repair shops, in shops on large farms, and for wholesalers and manufacturers.	Most are hired as helpers and learn the trade on the job. Employers prefer applicants who have an aptitude for mechanical work. A farm background is an advantage. High school or vocational school courses in repairing diesel or gasoline engines, blueprint reading, the maintenance and repair of hydraulics, and welding are helpful, as are basic math and science courses.	Mechanics often have to travel miles to repair equipment in the field, especially during busy harvest and planting times.
Buyers and Shippers, Farm Products	These workers perform a variety of duties, depending on the type of commodity they deal in. Most buy commodities from producers and then sell and ship them to retail or wholesale outlets. Many buyers work for themselves. Others work for supermarket chains and other large purchasers of farm products.	A farm background is helpful since buyers are responsible for the quality of the products they deal in. They also should possess many of the traits of successful sales workers, such as aggressiveness and the ability to deal with people. Some States require that buyers be licensed.	The job provides numerous opportunities for travel, working outdoors, and dealing with other people.
Veterinarians	Veterinarians deal with diseases and injuries among animals. They perform surgery and prescribe and administer drugs, medicines, and vaccines. Some inspect foods as part of public health programs, teach, or do research. Most veterinarians are in private practice. The type of practice varies according to the geographic setting. Veterinarians in rural areas mainly treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets. Some work for government health agencies, colleges of veterinary medicine, research laboratories, large livestock farms, animal food companies, and pharmaceutical firms.	It takes many years of schooling to become a veterinarian. To qualify for the required license, candidates usually must complete at least 2 years of college (although most complete more) and 4 years in a college of veterinary medicine and pass a State Board examination. Positions in research and teaching often require an additional master's or Ph. D. degree. Some States issue licenses to veterinarians already licensed by another State without further examination. High school students interested in becoming veterinarians should take as many science courses as possible.	Most veterinarians begin as employees or partners in established practices. The job may involve long and irregular hours, traveling and outdoor work, and danger of injury, disease, or infection.

Exploring Careers

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
FORESTRY OCCUPATIONS			
Foresters	Foresters manage, develop, and protect forest resources, including timber, water, wildlife, forage, and recreational areas. They plan and supervise the cutting and planting of trees and have other duties ranging from wildlife protection and watershed management to the development and supervision of camps, parks, and grazing lands. Not quite half work in private industry. About one-fourth work for the Federal Government, primarily in the Forest Service. The remainder work for State and local governments, colleges and universities, or consulting firms.	A bachelor's degree with a major in forestry is the minimum requirement. Advanced degrees, however, are becoming increasingly important. Foresters must enjoy working outdoors, be able to work well with people, express themselves clearly, and be willing to move to remote places. High school courses in English, public speaking, math, and science are helpful.	Foresters often specialize in one area of work, such as timber management, outdoor recreation, or forest economics.
Forestry Technicians	These workers help foresters care for and manage forest lands and their resources. They may help estimate timber production for a certain area; inspect trees for disease and other problems; help prevent and control fires; and maintain forest areas for hunting, camping, and other activities. About half work in private industry, mainly for logging, lumber, and paper companies. Federal and State governments employ the rest, with the Forest Service employing the majority.	Enthusiasm for outdoor work, physical stamina, and the ability to work without direct supervision are essential. Formal training after high school is becoming increasingly important, although some people get jobs based on work experience on firefighting crews, in tree nurseries, or in park and recreation work. One and two-year programs in forestry technology are offered by technical institutes, community and junior colleges, and universities. High school courses in English, math, and science are helpful.	Opportunities for summer and part-time work are good. Working summers provides experience that can later help in getting a job. Forestry technicians spend considerable time outdoors in all kinds of weather, sometimes in remote areas. They work many extra hours in emergencies, such as fighting fires and controlling floods.
Loggers	These workers harvest trees. Their specific job titles usually indicate the part of the harvesting process with which they are involved. *Fallers*, for example, use power saws to cut down large trees. As soon as the tree is down, *buckers* saw the limbs off and cut the trunks into logs. *Choker setters* then attach steel cables (chokers) to the logs which are then skidded out of the woods by *logging-tractor operators*. A *rigging slinger* supervises and assists choker setters and tractor drivers.	Most loggers get their first jobs without previous training. Entry level jobs usually can be learned in a few weeks by observing and helping experienced workers. Because the jobs involve some heavy labor, loggers should be in good physical condition and have stamina and agility. Because of the dangers involved in the work, loggers should be alert and well coordinated. Loggers usually start by helping choker setters or buckers. As they become more experienced, they may advance to more highly skilled jobs as vacancies occur.	Loggers often must do their jobs under unpleasant working conditions. Most jobs are outdoors and the weather can be very hot and humid or extremely cold. The forest may be very wet and muddy, with many annoying insects during the summer. Sometimes, working time and pay may be lost because of bad weather. Also, the work is more hazardous than most jobs. For many persons, however, the opportunity to work and live in forest regions, away from crowded cities, more than offsets these disadvantages. Many loggers are members of unions.

Agriculture, Forestry, and Fishery Occupations

Occupation	*Nature and Places of Work*	*Training and Qualifications*	*Other Information*
FISHERY OCCUPATIONS			
Fishers	These workers harvest fish, shellfish, and other aquatic animal life using a variety of methods. Usually, the methods depend on where they are fishing and the type of fish they are trying to catch. Tuna fishers on the West Coast, for example, may use huge nets that encircle an entire school of tuna fish, while lobster fishers in Maine use wooden traps to catch their quarry.	Commercial fishing is not easy work. Fishers should be willing to work long hours and should be in good physical condition. Good eyesight is also essential for fishers involved with operating fishing vessels. High school courses in mathematics, chemistry, and physics are helpful.	Many fishers must spend considerable time at sea. Earnings fluctuate greatly in this field, since they often depend on the number and type of fish caught.
Fish Farmers	These workers, also called fish culturists, raise fish for stocking streams and for the live-bait industry. They also raise fish for food. They work mainly in fish hatcheries and are responsible for providing a suitable environment for the type of fish being raised. To do this, they adjust the volume, depth, velocity, and temperature of the water. They also plan feeding programs and check fish for signs of disease. They also may make arrangements with buyers for the sale of the fish they raise.	These workers usually need a minimum of 4 years in college leading to the bachelor's degree in an aquatic biology curriculum. Experience gained working part time or summers in a fish hatchery is also useful. High school courses in physics, chemistry, biology, English, communications, and mathematics are helpful.	Aquaculture is an area offering increasing opportunities for employment with private enterprises.

Answers to Related Occupations

FARMER

1. Farm manager, 2. Farm equipment mechanic, 3. Farm laborer, 4. Agricultural pilot, 5. Agricultural products broker, 6. Veterinarian.

COOPERATIVE EXTENSION SERVICE WORKER

1. a, 2. b, 3. a, 4. c, 5. b.

FORESTER

1. Forestry aide, 2. Farmer, 3. Wildlife biologist, 4. Range manager, 5. Soil conservationist.

Answers to math problems

FARMER

1. 24,000 bushels, 2. a. $2.50 per bushel, b. $3.50 per bushel, 3. $2,240, 4. $1.20 profit for each bushel fed.

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Occupational Outlook Handbook

One of the most widely used resources in the field of vocational guidance, the Handbook is an "encyclopedia of careers" covering several hundred occupations. A new edition is published every 2 years. The reader will find information on

- What the work is like
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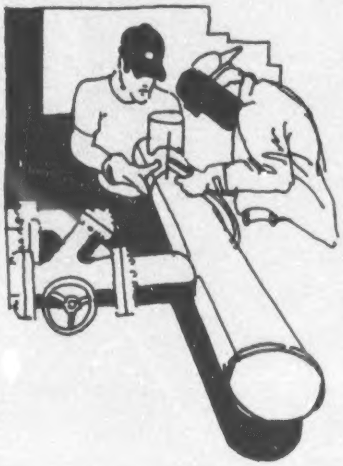

Contact any of the BLS Regional Offices listed inside the back cover for price and ordering information.

Occupational Outlook Quarterly

A periodical to help students, job seekers, counselors, and education planners keep up with occupational and employment developments. The Quarterly is written in nontechnical language and illustrated in color. Articles cover such topics as these:

- Job prospects for college graduates
- How to look for a job
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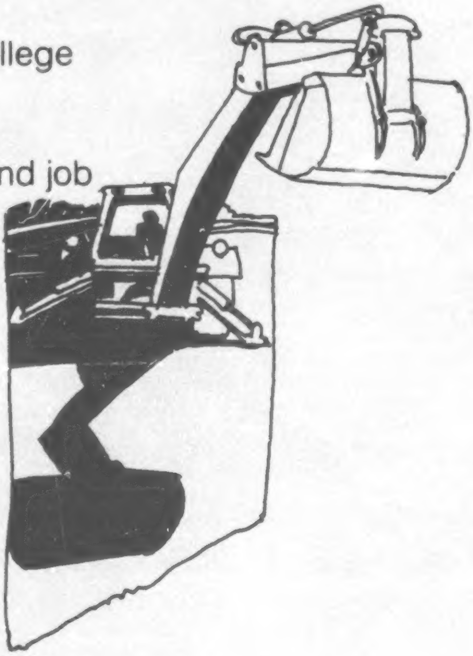

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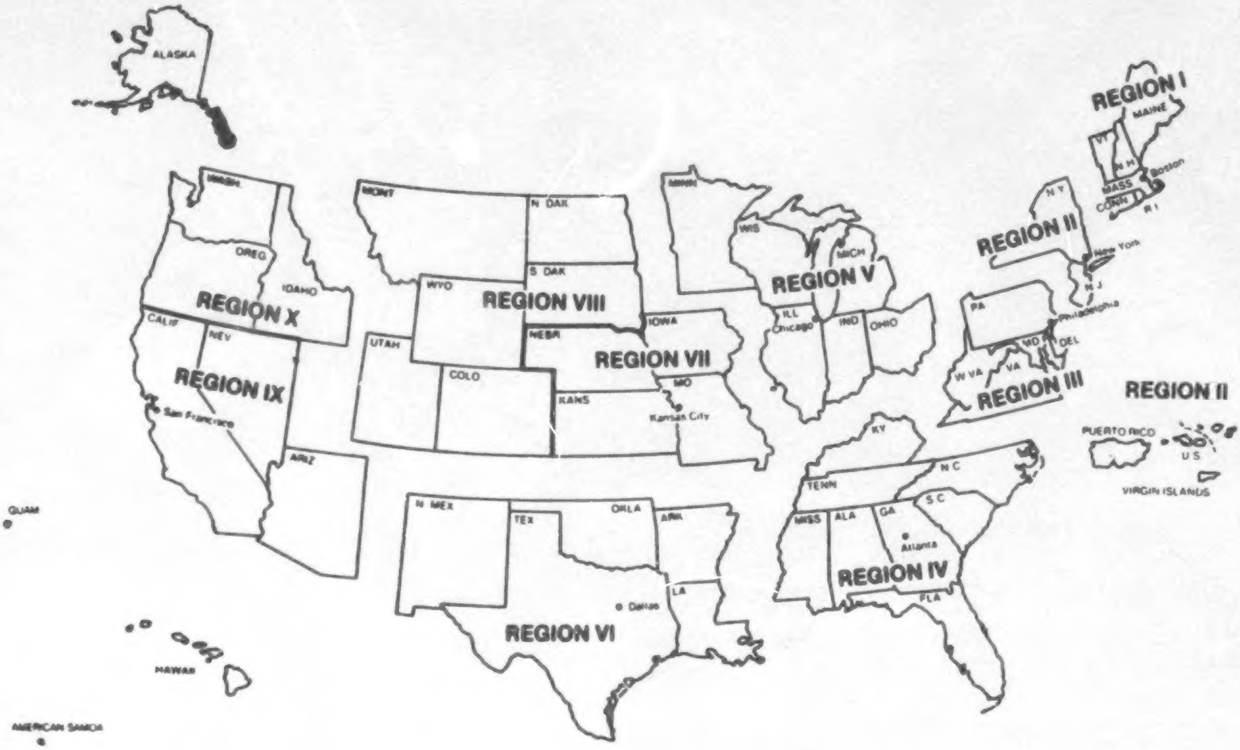
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